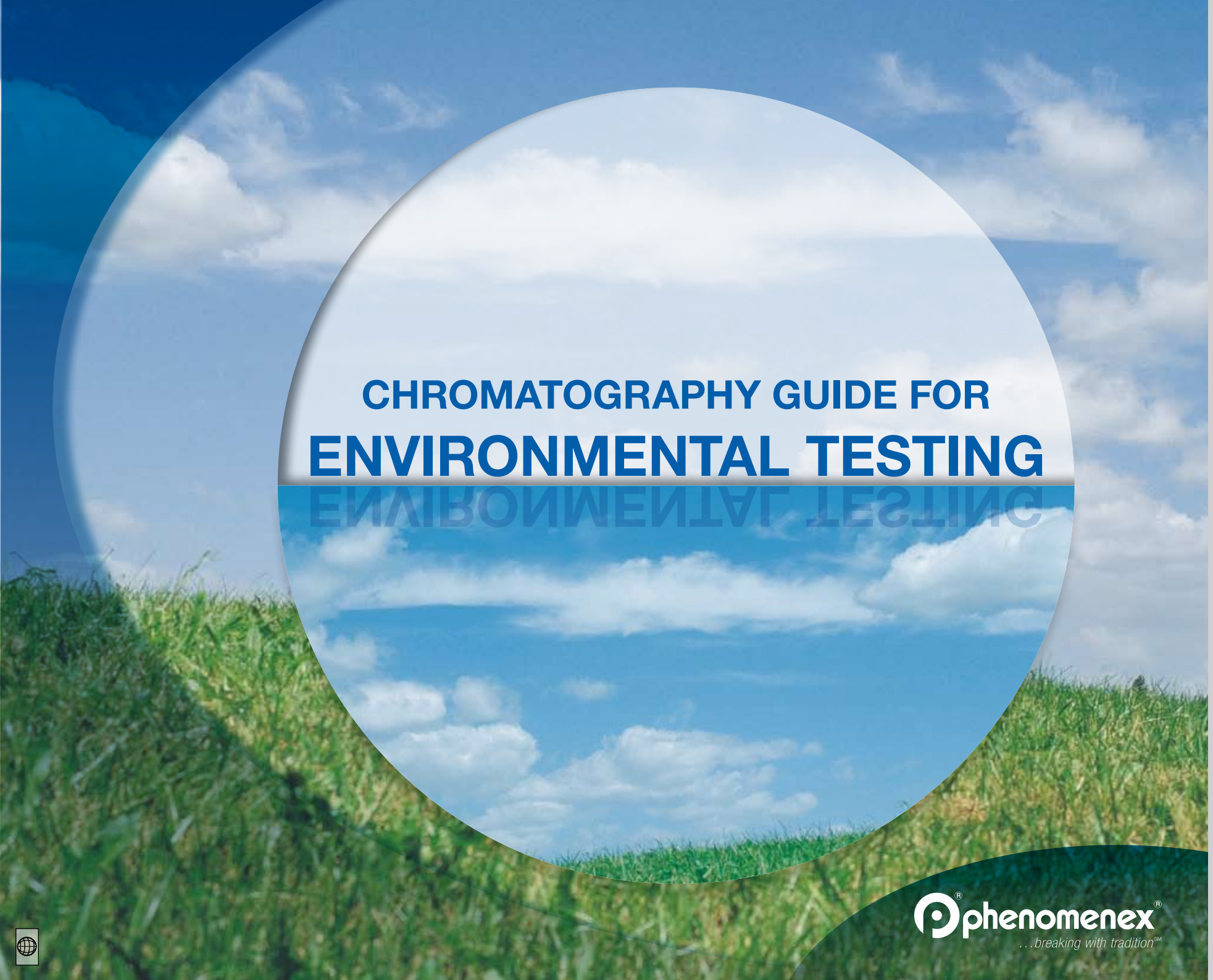

CHROMATOGRAPHY GUIDE FOR ENVIRONMENTAL TESTING

phenomenex®
. . . breaking with tradition℠

Our Commitment to Environmental Testing

In recent years, there has been a rapid, worldwide increase in environmental testing.

As the focus on environmental contaminants and cleanup has increased, there is heightened demand for more sensitive analytical tests to measure the amount of pollutants in the environment. Since 1982, Phenomenex has been committed to developing a broad range of products that will help companies accurately and reliably identify and quantify these contaminants.

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guarantee

If you are not completely satisfied with any of the products featured in this brochure, return within 45 days for a **FULL REFUND.***

* This guarantee is not valid in India and China

Sample Preparation / SPE

HPLC Analysis

GC Analysis

SPECIALIZED PRODUCTS
for Environmental Testing

Sample Preparation / SPE

Improved Extraction with Strata® SPE Sorbents

- For removal of target analytes from the matrix

Many government agencies have approved the removal of target analytes from various matrices using Solid Phase Extraction (SPE), also referred to as Liquid Solid Extraction (LSE), in place of traditional Liquid-Liquid Extraction (LLE) methods for extraction and cleanup procedures. Strata SPE sorbents can extract, cleanup, and concentrate all in one method that can save you hours of work per sample.

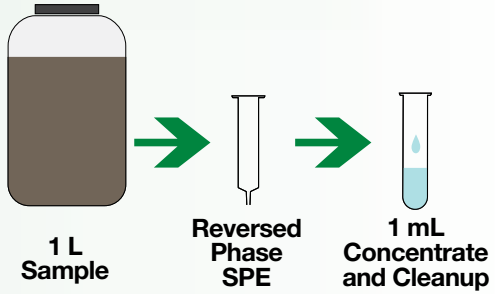
Advantages over LLE

- Save time and money with extraction, cleanup, and concentration in one method
- Process multiple samples at one time
- Improve results with higher recoveries
- Reduce sample contamination
- Reduce solvent consumption

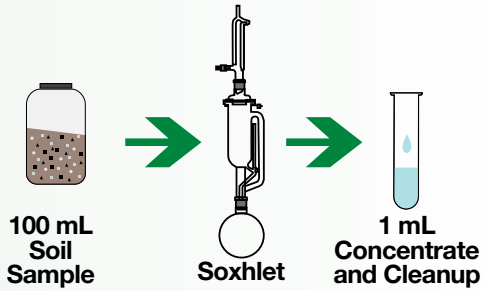
Recommended Sorbents	Use
Strata SDB-L (Styrene-divinylbenzene) **Strata C18-E (Silica-based)** **Strata™-X (Polymeric Sorbent)**	• Isolating target organic analytes from aqueous samples • Extracting desired polars and non-polars e.g. organochlorine pesticides, phthalate esters, explosives, etc. from aqueous matrices including groundwater, wastewater, etc. • Also referred to as liquid-solid extraction (LSE) in EPA Drinking Water methods.

Common Methods for Initial Extraction

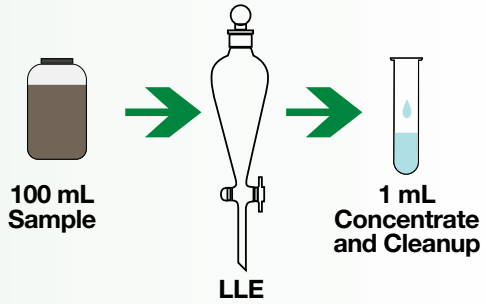
Reversed Phase SPE



Soxhlet LLE Extraction



LLE Extraction



Effective Sample Preparation

Successful sample preparation is key to achieving consistent results and fewer sample re-tests. Environmental samples can be some of the most challenging to work with due to the high level of contamination and the large volumes necessary to achieve the required detection limits.

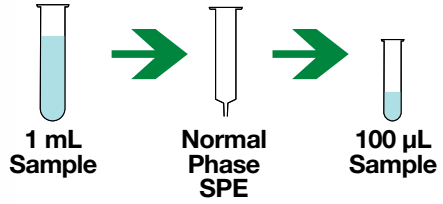
Sample Preparation / SPE

Removal of Contaminants with Further Cleanup Using Strata® SPE

- Remove contamination and improve method stability and results
- Decrease LC and GC system maintenance with cleaner samples

Depending on the source, environmental samples can contain any number of interferences, from hydrocarbons and PCBs to acids and bases. When monitoring biological samples, there may be the further complication of removing the high molecular weight fats and proteins before analysis. No matter what the extraction procedure, effective removal of these contaminants using Strata SPE sorbents is the key to reducing system maintenance. Strata SPE sorbents are specifically designed, engineered, and manufactured for optimal cleanup of any extract.

Final Cleanup by SPE



Regardless of the matrix (water, soil, or tissue), environmental samples typically require a general cleanup procedure in order to remove unwanted interferences and concentrate target analytes. Phenomenex's Strata SPE Products are designed to meet all of your sample preparation needs.

Recommended Sorbents	Use
Strata Alumina-N (AL-N)	• Removal of polar contaminants from sample extracts; cleanup of non-polar analytes such as organochlorine pesticides, polynuclear aromatic hydrocarbons (PAHs), nitrosamines, etc. • Cleanup of extracts that saves time and labor processing multiple samples simultaneously
Strata Florisil® (FL-PR)	• Removal of polar contaminants from sample extracts; cleanup of non-polar analytes such as organochlorine pesticides, polynuclear aromatic hydrocarbons (PAHs), nitrosamines, etc. • Pesticide residue grade yields superior efficiency and purity for cleanup of sample extracts
Strata Silica (Si-1)	• Removal of polar contaminants from sample extracts; cleanup of non-polar analytes such as organochlorine pesticides, polynuclear aromatic hydrocarbons (PAHs), nitrosamines, etc. • High purity silica for superior cleanup efficiency of sample extracts
Strata EPH (Silica-based) (Extractable Petroleum Hydrocarbons)	• Remove polar contaminants faster than with standard silica and without flow problems • Fractionate aliphatic from aromatic hydrocarbons • Reduce phthalate contamination using Teflon®-coated SPE tubes
Sepra Bulk Silica Gel **Sepra Bulk Florisil®** **Sepra Bulk Alumina-N**	• Removal of polar contaminants for cleanup of extracts • Consistently pure bulk silica with extensive QC

HPLC Analysis

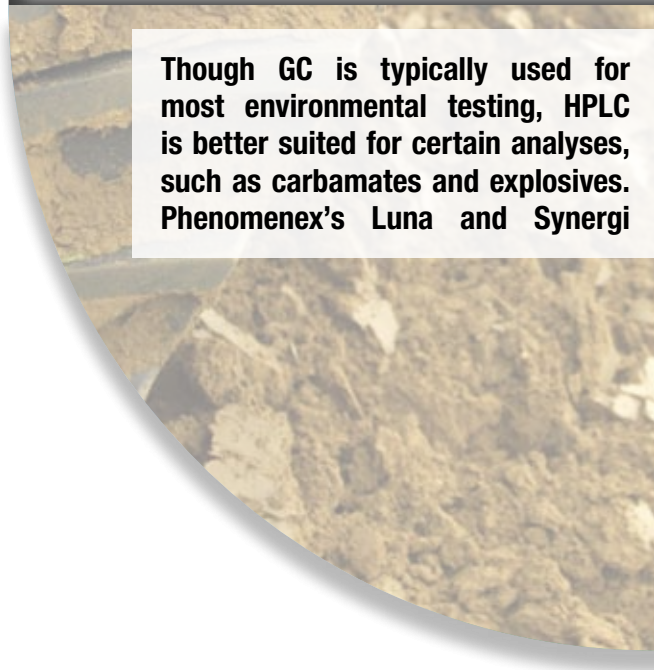
Luna® High Performance Silica-based Columns

- Industry benchmark for HPLC columns
- Wide pH stability for long column lifetime
- Extensive method validation document for proven reproducibility

Luna has found a place as one of the world's top reversed phase columns because it provides a measurable improvement over many HPLC columns for two important chromatographic properties: resolution and peak shape. The excellent performance of Luna columns is not simply the result of ultrapure, metal-free silica (99.99 % purity). It is the result of meticulous care given to the quality control of surface smoothness, pore structure and pore consistency to ensure particles of uniform structure and enhanced mechanical strength.

Analysis	Recommended Solution	Page
Carbamate Pesticides by HPLC	Luna CN (Cyano)	18
Explosives by HPLC (Confirmation Column)	Luna Phenyl-Hexyl	19

Improved Selectivity with Quality HPLC Columns



Though GC is typically used for most environmental testing, HPLC is better suited for certain analyses, such as carbamates and explosives. Phenomenex's Luna and Synergi

Synergi - Advancing LC Selectivity

Scientists worldwide are using Synergi™ columns to simplify their HPLC method development. With four unique phases in its portfolio, Synergi columns are designed to provide advanced selectivity options for all types of environmental analysis.

Analysis	Recommended Solution	Page
Explosives by HPLC (Primary Column)	Synergi Hydro-RP	19
Polynuclear Aromatic Hydrocarbons by HPLC	Synergi Max-RP	16

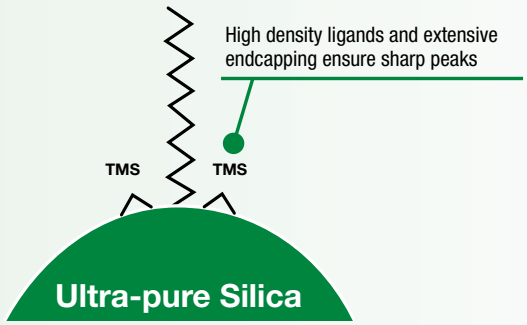
columns provide an improved solution for this type of testing. Both provide great peak shape, better resolution and higher sensitivity for environmental samples.

Advancing LC Selectivity

Synergi Max-RP

C12 TMS Endcapped

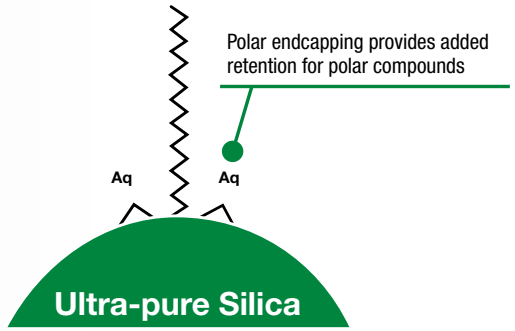
Excellent for basic compounds at neutral pH



Synergi Hydro-RP

C18 Polar Endcapped

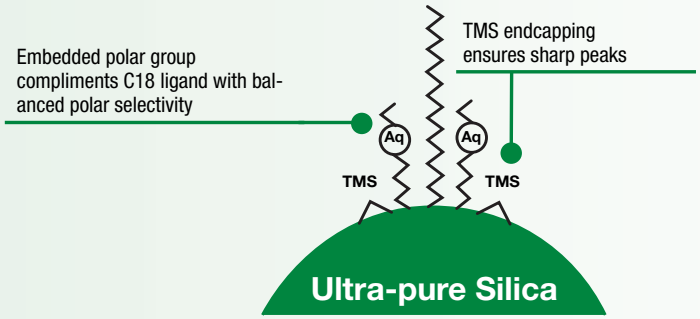
Strong non-polar and polar retention



Synergi Fusion-RP

C18 Polar Embedded

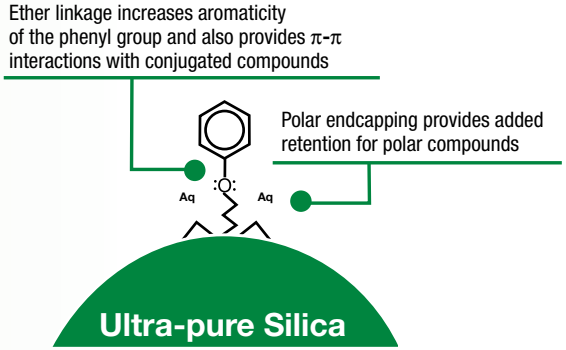
Balanced non-polar and polar performance



Synergi Polar-RP

Phenyl Ether-Linked

For polar and aromatic mixtures



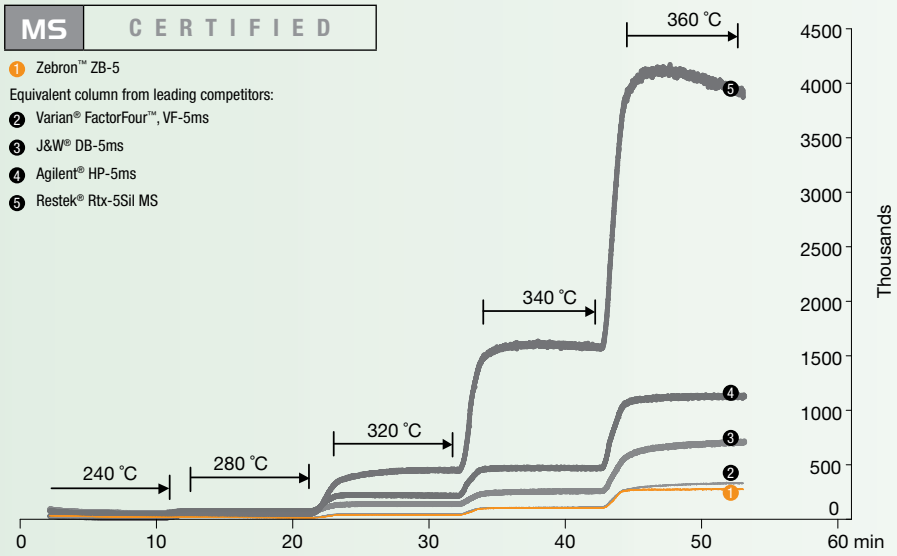
GC Analysis

Zebron™ GC Columns Provide Resolution for Environmental Analysis

- Extended column lifetime
- Unsurpassed high temperature stability
- Exceptional low bleed and column activity

Our commitment to quality is what makes Zebron GC columns one of the fastest growing GC column lines on the market. Each and every column you receive undergoes an exhaustive QC check process that ensures all columns provide the highest level of performance.

Column Bleed Comparison Test by MS Detection



Dimensions: 30 meter x 0.25 mm x 0.25 µm

Injection: 225 °C with a constant flow of 1.1 mL/min of helium

Oven Program: 240 °C for 10 min to 280 °C @ 40 °/min for 10 min to 320 °C @ 40 °/min for 10 min to 340 °C @ 40 °/min for 10 min to 360 °C @ 40 °/min for 10 min

Detector: MS, Scan range: 36-450 amu

Testing conditions were similar for all columns. All columns were new and obtained from the original manufacturer or its authorized channels. Data provided by Phenomenex in-house evaluations and represents bleed values obtained after 2 hours of conditioning.

Enhanced Resolution with Zebron GC Columns

In the last 15 years, not much has changed in the field of gas chromatography. However, technology is our passion and the Zebron brand is

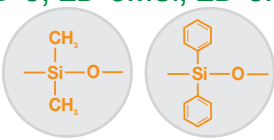
GC Analysis

Phenomenex's Zebron 5 %-Phenyl or 5 %-Phenyl-Arylene phases are well suited for the vast majority of environmental methods. Selecting the proper 5 % phase for your analysis depends on your needs.

All of our 5 % phases utilize one of two main types of chemistries: 5 %-Phenyl or 5 %-Phenyl-Arylene. The differences between the two phases can be slight but significant to the chromatography result.

In Phenyl-Arylene phases, the phenyl ring is incorporated into the polymer backbone creating a web-like network which compounds must negotiate in order to interact with the stationary phase. Since the access to the phenyl rings is more limited, compounds with a geometry that "fits" into the polymer network will tend to interact more strongly with the phenyl in the stationary phase. Resolution differences are most commonly observed when analyzing multi-ring aromatics such as PAHs and PCBs due to their rigid structure. However, resolution differences can also be observed for other aromatic compounds.

ZB-5, ZB-5MSi, ZB-5HT



95 % Dimethylpolysiloxane — 5 % Phenyl

ZB-5ms

95 % Dimethylpolysiloxane — 5 % Phenyl-Arylene

gaining international recognition for its new products that are specially designed for today's most challenging environmental methods.

Application	Phase/ Temperature Limits	Features	Benefit	Equivalent To
General use with both MS & non-MS detectors Great for non-active compounds	**ZB-5** 5 %-Phenyl- 95 %-Dimethylpolysiloxane Temperature Limits: -60 to 360/370 °C	High stability Low bleed phase (MS Certified) Lower cost	Versatile, lower cost column for general applications with various detectors	HP-5, DB-5, Rtx-5, SPB-5, CP-Sil 8 CB, AT-5, BP5, Equity5, BPX5
High-temperature applications, dirty samples, long-chain hydrocarbons, high boilers, waxes, fuels	**ZB-5HT** 5 %-Phenyl- 95 %-Dimethylpolysiloxane Temperature Limits: -60 to 400/430 °C	Award winning 430 °C stable phase Improved polyimide coating = flexible tubing after prolonged use above 400 °C Low bleed phase (MS Certified)	Increased temperature stability leads to improved column lifetime – saving time & money Remove contaminants using high temperature bake outs Replaces problematic metal columns	DB-5ht, VF-5ht, Stx-5HT, XTI-5HT
The analysis of active compounds such drugs, amines, or acids that exhibit poor peak shape Suitable for MS sensitive analysis	**ZB-5MSi** 5 %-Phenyl- 95 %-Dimethylpolysiloxane Temperature Limits: -60 to 360/370 °C	New proprietary deactivation process decreases column activity Aggressive phase cross linking results in very low bleed levels (MS Certified)	Improved peak shape for acids, bases, and drug compounds Extend performance for active compounds Higher temperature limits allow for removal of column contamination	HP-5ms, HP-5msi, Rxi-5ms, Rtx-5ms, AT-5ms, DB-5
Semi-volatile mixtures containing acids, bases, and neutrals Aromatics, PAH, or PCBs General MS applications	**ZB-5ms** 5 %-Phenyl-Arylene- 95 %-Dimethylpolysiloxane Temperature Limits: -60 to 325/350 °C	Arylene Matrix Technology™ (AMT) provides highly cross linked phenyl-arylene phase Slightly different selectivity to non-arylene 5-type phases Highly deactivated MS Certified	Phase chemistry reduces "back-biting" and lowers column bleed Phenyl-Arylene bonded phase improves resolution of aromatic compounds Reduced activity for acidic and basic compounds leads to better quantitation	DB-5ms, DB-5.625, DB-5ms EVDX, VF-5ms, CB-Sil 8 CB MS, Rtx-5 SilMS

GC Analysis

Specialized GC Columns for Environmental Testing

In addition to the standard 5 %-phenyl phase columns, Phenomenex offers several Zebron™ GC column phases specially designed to provide optimum selectivity for a variety of environmental compounds. Since each analysis is unique, we can help you determine the best phase to use in order to resolve your sample.

ZB-MultiResidue™-1 & -2

Improved Analysis of Pesticides, Herbicides and Insecticides

Temperature Limits: -60 to 320/340 ˚C (Isothermal/TPGC)

ZB-MultiResidue™ GC columns have been optimized for pesticides, herbicides, or insecticides analysis. These columns have an orthogonal selectivity that allows them to be used together in dual column confirmation analysis. Both phases are also MS Certified, so they can be used on MS to confirm results or for multi-pesticide residue screening methods.

ZB-624

Enhanced Resolution of VOCs

Temperature Limits: -20 to 260 ˚C

Specifically designed for the separation of volatile organic compounds (VOCs), the Zebron ZB-624 column has an increased temperature limit over other Cyanopropylphenyl phases. This helps to speed up run times and re-equilibration.

ZB-XLB

Ideal for Identifying Unknown Contaminants

Temperature Limits: 30 to 340/360 ˚C (Isothermal/TPGC)

The Zebron ZB-XLB is a unique, low-polarity si-arylene GC column. Engineered specifically for bleed-sensitive detectors such as mass spectrometers, these new columns are ideal for resolving complex samples and identifying unknown contaminants. This column also provides alternative selectivity to standard 5-type phases.

ZB-50

Rugged Column for General Screening of Environmental Compounds

Temperature Limits: 40 to 320/340 ˚C (Isothermal/TPGC)

The Zebron ZB-50 is more rugged than other polar phases. With a temperature limit of 340 °C, this column provides longer lifetime and allows for high-temperature bake-out to remove contaminants. In addition, the Zebron ZB-50 column is inert, which minimizes analyte adsorption and improves efficiency and reproducibility.

Zebron GC columns are also available in other standard phases. Please inquire with your Phenomenex GC Specialist for more details.

APPLICATIONS

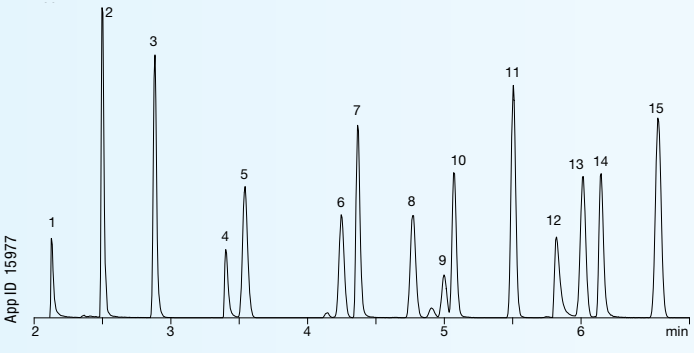
Total Petroleum Hydrocarbon (GROs and DROs)
Diesel Fractionation Methods
Pesticides by GC
Polynuclear Aromatic Hydrocarbons (PAHs) by HPLC and GC/MS
Carbamate Pesticides by HPLC
Explosives by HPLC
Volatile Organics (VOCs) by GC/MS
Semi-Volatiles (SVOs) by GC/MS

Total Petroleum Hydrocarbon (GROs)

Enhanced Gasoline Range Organics (GROs) Separation by Zebron™ ZB-5ms and ZB-WAX

- Enhanced separation by boiling point
- Runs completed in under 7 minutes

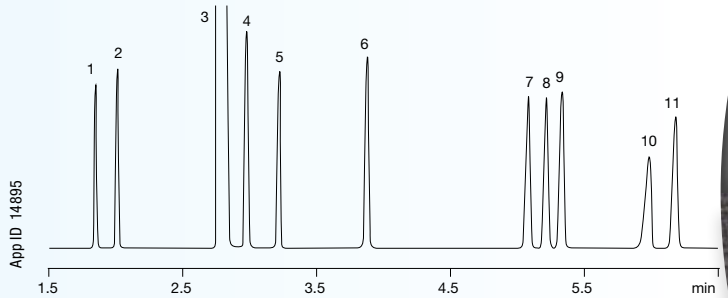
MTBE in Gasoline



Column: Zebron ZB-5ms
Dimensions: 30 meter x 0.25 mm x 1.00 µm
Part No.: 7HG-G010-22
Injection: Split 15:1 @ 160 °C, 0.5 µL
Carrier Gas: Helium @ 1.1 mL/min (constant flow)
Oven Program: 35 °C for 3 min to 100 °C @ 5 °C/min
Detector: MSD; 30-350 amu
Sample: Analytes were 150 ppm in methanol

1. Ethanol
2. Isopropyl alcohol
3. tert-Butanol
4. 1-Propanol
5. Methyl tert butyl ether (MTBE)
6. Isopropyl ether
7. 2-Butanol
8. Ethyl tert butyl ether (ETBE)
9. Methylcyclopentane
10. Isobutyl alcohol
11. tert-Pentanol
12. 1,2-Dimethoxyethane
13. Benzene
14. 1-Butanol
15. 2-Methoxy-2-methyl butane (TAME)

BTEX in Under 6 Minutes!



Column: Zebron ZB-WAX
Dimensions: 30 meter x 0.32 mm x 0.50 µm
Part No.: 7HM-G007-17
Injection: Split 20:1 @ 250 °C, 0.2 µL
Carrier Gas: Helium @ 2.0 mL/min (constant flow)
Oven Program: 60 °C to 75 °C @ 15 °C/min to 90 °C @ 3 °C/min (for 3 min)
Detector: FID @ 300 °C
Sample:

1. Pentane
2. Heptane
3. Solvent (methylene chloride)
4. Benzene
5. Decane
6. Toluene
7. Ethylbenzene
8. *p*-Xylene
9. *m*-Xylene
10. Dodecane
11. *o*-Xylene

Fast Analysis of Total Petroleum Hydrocarbon

Environmental contamination from fuel leaks or spills is a problem in many countries. The contamination often comes from various sources such as gasoline pumps, spilled oil on pavement, motor fuel station underground storage tanks (UST), or home and commercial heating oil storage tanks. The analysis of fuel samples

Total Petroleum Hydrocarbon (DROs)

Fast Diesel Range Organics (DROs) by Zebron™ ZB-5HT Inferno™

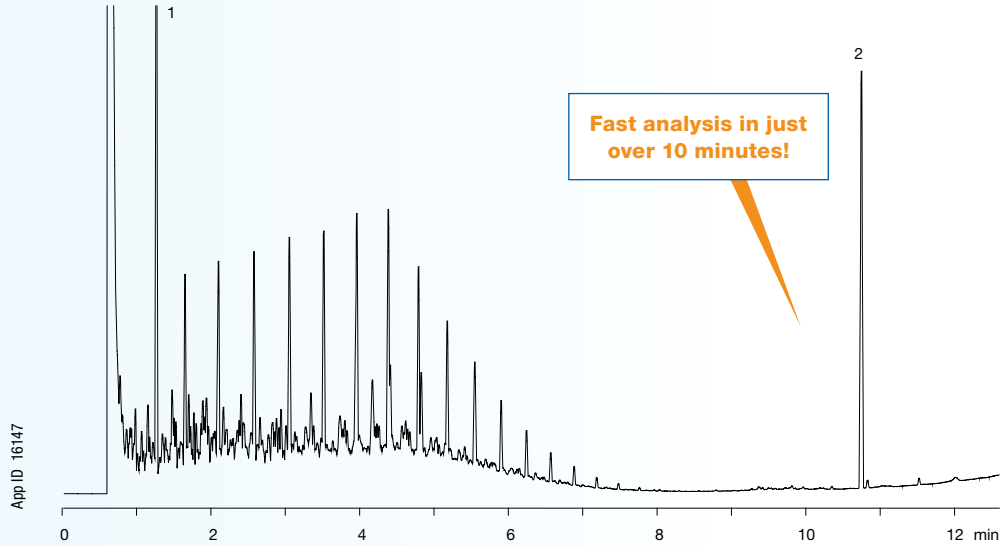
- High temperature (430 °C) limit for long lifetime
- Bake off contaminants and eliminate carry-over

Time Saving Tip

Rapid analysis of DROs can be achieved by using a Zebron ZB-5HT Inferno GC column. The column's high thermal stability (430 °C) allows you to run your oven at a high temperature while reducing run time.

can be separated into two main fractions: Gasoline Range Organics (GROs) and Diesel Range Organics (DROs). Zebron GC columns can provide fast run times of both GROs and DROs. MTBE and BTEX are completed in less than 7 minutes and diesel fuel in just over 10 minutes.

Fast H53 Analysis of Diesel Fuel



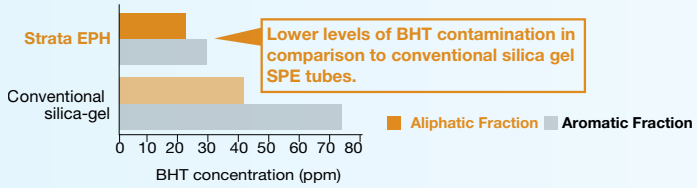
Column: Zebron ZB-5HT Inferno
Dimensions: 15 meter x 0.32 mm x 0.10 µm
Part No.: 7EM-G015-02
Injection: On-Column @ 63 °C, 0.1 µL
Carrier Gas: Helium @ 2.7 mL/min (constant flow)
Oven Program: 60 °C to 375 °C @ 25 °C/min
Detector: FID @ 400 °C
Sample: Diesel fuel was 200 ppm in dichloromethane with internal standards at 50 ppm.
1. Decane (C10)
2. Tetracontane (C40)

Diesel Fractionation Methods

High Recovery of Diesel Fractionation with Strata® EPH

- Selectively elute aliphatics and aromatics
- Fast flow rates for increased productivity
- Reduce processing time by up to 50 % without using vacuum
- Significant reduction of contamination from plasticizers, such as BHT

Reduced BHT Contamination



SPE Method

Sorbent: Strata EPH, 5 g/20 mL
Part No.: 8B-S031-LEG
Condition: 30 mL of hexane
Load: 2 mL of EPH standard containing a blank, 5 ppm, and 50 ppm sample of aliphatic, aromatic, and surrogate
Elute: The aliphatic fraction was eluted with 11 mL of hexane. The aromatic fraction was eluted with 20 mL of methylene chloride.
Concentrate: Concentrate to a final volume of 1 mL and analyze by GC

Table 1. Aromatic fraction data. RSD for aromatic = 8.8 %

Peak	Compound	% Recovery	% RSD (n=3)	Retention Time (min)	GC % RSD
1	Naphthalene*	67.2	2.2	7.392	11.67
2	2-Methylnaphthalene*	72.1	1.7	9.185	12.59
3	2-Fluorobiphenyl (Frac Surr)		1.0	10.307	
4	Acenaphthalene	72.9	1.3	11.602	13.12
5	2-Bromonaphthalene (Frac Surr)			11.985	
6	Acenaphthene	76.2	1.3	12.086	
7	Phthalate	97.9		12.313	13.24
8	Fluorene	92.8	2.2	13.544	13.14
9	Phanthrene	84.0	2.7	16.215	13.04
10	Anthracene	84.3	2.2	16.354	12.82
11	o-Terphenyl (Surr)			17.488	
12	5-α-Androstane			18.900	
13	Fluoranthene	84.1	2.2	19.568	13.23
14	1-Chloro-Octadecane (Surr-Aliphatic)			19.667	
15	Pyrene	88.3	2.2	20.169	10.24
16	Benz[a]anthracene	87.4	2.0	23.627	12.22
17	Chrysene	97.0	2.0	23.724	12.30
18	Benzo[b]fluoranthene	90.6	2.4	26.477	11.59
19	Benzo[k]fluoranthene	91.9	1.7	26.546	11.84
20	Benzo[a]pyrene	91.4	1.7	27.245	11.34
21	Indeno[1,2,3-cd]pryene	94.8	1.1	29.732	10.62
22	Dibenz[a,h]anthracene	92.7	1.2	29.829	10.96
23	Benzo[g,h,i]perylene	90.5	1.1	30.274	10.58

Table 2. Aliphatic fraction data. RSD for C_9-C_{18} Class = 5.3 %. RSD for C_{18}-C_{36} Class = 3.8 %

Peak	Compound	% Recovery	% RSD (n=3)	Retention Time (min)	GC % RSD
1	n-Nonane (C9)	88.4	2.3	3.018	4.37
2	n-Decane (C10)	91.9	2.3	4.283	4.87
3	n-Dodecane (C12)	92.8	2.2	7.458	5.30
4	n-Tetradecane (C14)	93.2	2.2	10.662	5.67
5	Butylhydroxytoluene (BHT)	—	—	12.315	—
6	n-Hexadecane (C16)	94.2	2.3	13.592	5.66
7	n-Octadecane (C18)	93.5	2.2	16.240	5.31
8	n-Nonadecane (C19)	91.1	1.9	17.473	5.11
9	n-Eicosane (C20)	92.8	1.9	18.648	5.10
10	5-α-Androstane (IS)	—	—	18.903	—
11	1-Chloro-Octadecane (Surr)	—	—	19.671	—
12	n-Docodane (C22)	92.9	1.8	20.848	4.75
13	n-Tetracosane (C24)	92.2	1.6	22.871	4.24
14	n-Hexacosane (C26)	92.4	1.6	24.741	3.47
15	n-Octacosane (C28)	93.4	1.5	26.478	2.65
16	n-Triacotane (C30)	95.9	1.4	28.098	2.29
17	n-Hexatriacontane (C36)	111.6	0.8	33.536	8.02

**Naphthalene and 2-methylnaphthalene are subject to reduced recoveries due to bleed into the aliphatic fraction and loss by evaporation.*

Reduced Phthalate Contamination of Diesel Fractionation

In an effort to provide better information about the toxicological impact of a fuel sample, many areas have adopted fractionation methodologies which allow the aliphatic and aromatic fractions to be determined separately. Phenomenex developed Strata® EPH, a specialized SPE sorbent designed to overcome the problems associated with traditional

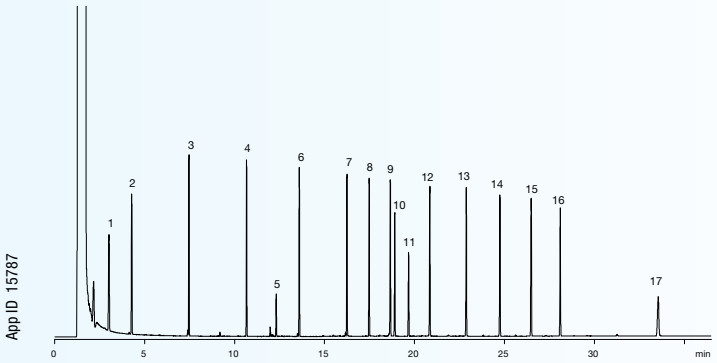
Diesel Fractionation Methods

Accurate GC Quantitation of Diesel Fractionation Methods Using the Zebron™ ZB-5ms

- Baseline resolution of all aliphatic fraction compounds from contaminants, internal standards, and surrogates
- Enhanced resolution of aromatic fraction allows for more accurate quantitation
- Great resolution of all target peaks from each other and from the internal standards and surrogates

silica gel fractionation, such as low recoveries and phthalate contamination. The sorbent was specially designed to provide fast, consistent flow rates, while still maintaining high recovery and efficient fractionation. The increased flow rate reduces your processing time, thus increasing productivity.

Aliphatic Fraction

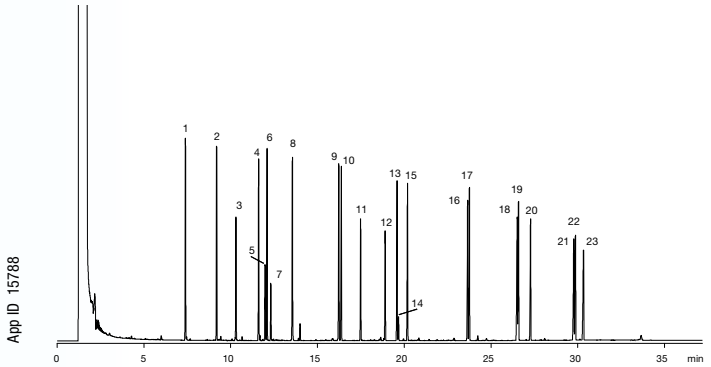


Conditions the same for both runs

Column: Zebron ZB-5ms
Dimensions: 30 meter x 0.32 mm x 0.25 µm
Part No.: 7HM-G010-11
Injection: Splitless @ 285 °C, 2 µL
Carrier Gas: Helium @ 3.0 mL/min (constant flow)
Oven Program: 60 °C for 1 min to 290 °C @ 8 °C/min for 6.75 min
Detector: FID @ 315 °C
Sample:

1. C9
2. C10
3. C12
4. C14
5. Butylhydroxytoluene
6. C16
7. C18
8. C19
9. C20
10. 5-α-Androstane (IS)
11. 1-Chloro-Octadecane (Surr)
12. C22
13. C24
14. C26
15. C28
16. C30
17. C36

Aromatic Fraction



Sample:

1. Naphthalene
2. 2-Methylnaphthalene
3. 2-Fluorobiphenyl (Frac Surr)
4. Acenaphthalene
5. 2-Bromonaphthalene (Frac Surr)
6. Acenaphthene
7. Phthalate
8. Fluorene
9. Phanthrene
10. Anthracene
11. o-Terphenyl (Surr)
12. 5-α-Androstane
13. Fluoranthene
14. 1-Chloro-Octadecane (Surr-aliphatic)
15. Pyrene
16. Benz[a]anthracene
17. Chrysene
18. Benzo[b]fluoranthene
19. Benzo[k]fluoranthene
20. Benzo[a]pyrene
21. Indeno[1,2,3-cd]pryene
22. Dibenz[a,h]anthracene
23. Benzo[g,h,i]perylene

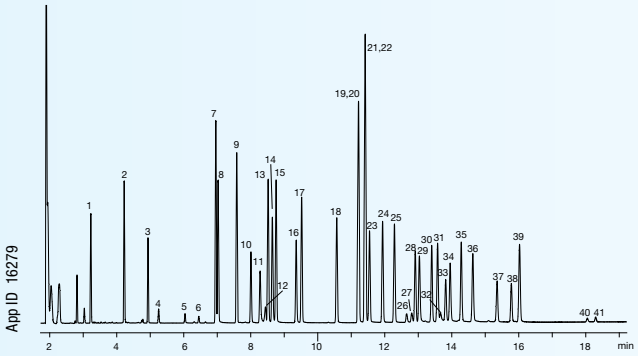
Pesticides by GC

Enhanced Resolution of Pesticides with Zebron™ MultiResidue™-1 & -2 GC Columns

- Inert for the sensitive pesticides such as Endrin and DDT
- Low bleed for sensitive analysis
- Optimized for pesticides and herbicides

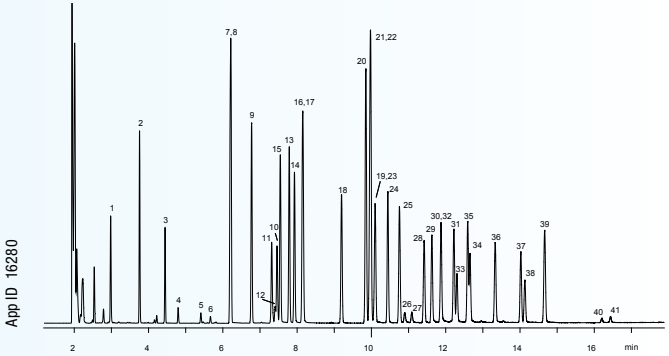
Organochlorine Pesticides

ZB-MR-1



Organochlorine Pesticides

ZB-MR-2



Conditions the same for both runs

Column: Zebron MultiResidue-1
Zebron MultiResidue-2

Dimensions: 30 meter x 0.32 mm x 0.5 µm
30 meter x 0.32 mm x 0.25 µm

Part No.: 7HM-G016-17
7HM-G017-11

Injection: On-Column @ 123 °C, 1 µL

Carrier Gas: Helium @ 1.2 mL/min (constant flow)

Oven Program: 120 °C for 0.5 min to 210 °C @ 30 °C/min to 300 °C @ 6 °C/min for 2 min

Detector: ECD @ 340 °C

Sample: All analytes are 50 ppb in isooctane

1. DBCP
2. Hexachlorocyclopentadiene
3. Etridiazole
4. Chloroneb
5. Propachlor
6. Diallate
7. a-BHC
8. Hexachlorobenzene
9. g-BHC
10. b-BHC
11. Dichlone
12. Alachlor
13. d-BHC
14. Chlorothalonil
15. Heptachlor
16. DCPA (Dacthal)
17. Aldrin
18. Heptachlor epoxide
19. Captan
20. trans-Chlordane (gamma)
21. cis-Chlordane (alpha)
22. trans-Nonachlor
23. Endosulfan I
24. 4,4'-DDE
25. Dieldrin
26. Chloropropylate
27. Chlorobenzylate
28. Endrin
29. Nitrofen
30. 4,4'-DDD
31. Endosulfan II
32. Kepone
33. Trithion
34. Endrin aldehyde
35. 4,4'-DDT
36. Endosulfan sulfate
37. Captafol
38. Methoxychlor
39. Endrin ketone
40. Permethrin
41. Permethrin isomer

Specialized GC Column for Pesticides Analysis

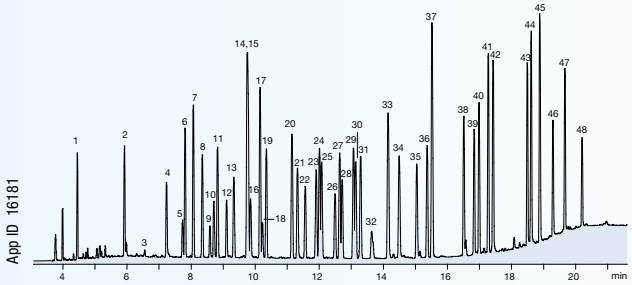
The use of many pesticides has been li and environmental risks. However, the left many sites heavily contaminated a cides are sensitive to system activity an nificant problem when working with low such as ECD. Zebron™ MultiResidue™ c deactivation step and provide excellen compounds.

Pesticides by GC

mited or discontinued due to the health
e persistence of these compounds has
nd in need of remediation. Many pesti-
d readily breakdown. This can be a sig-
w level samples and sensitive detectors
columns have undergone a proprietary
t peak shape for even the most active

Organophosphorous Pesticides

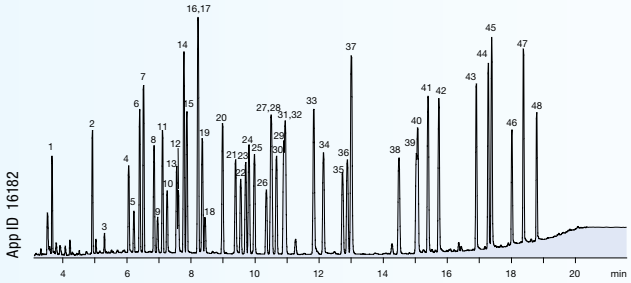
ZB-MR-1



Organophosphorous Pesticides

Please inquire about conditions

ZB-MR-2



Conditions for Organophosphorous Pesticides (App ID 16181) on ZB-MR-1

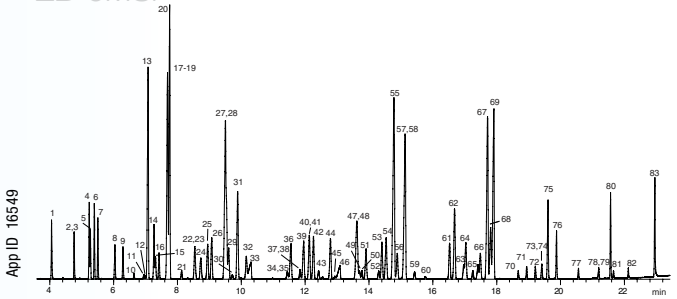
Dimensions: 30 meter x 0.32 mm x 0.50 µm
Injection: On-column @ 103 °C, 1 µL
Carrier Gas: Helium @ 2.8 mL/min (constant flow)
Oven Program: 100 °C for 0.5 min to 180 °C @ 20 °C/min to 240 °C @ 6 °C/min to 320 °C @ 15 °C/min for 2 min
Detector: FID @ 340 °C
Sample: Analytes at 2 ppm in dichloromethane. Columns connected using a 5 m Z-Guard and a Y-splitter

1. Dichlorvos
2. Mevinphos
3. Trichlorfon
4. TEPP (Tetraethyl Pyrophosphate)
5. Demeton isomer
6. Thionazin
7. Ethoprop
8. Sulfotep
9. Naled
10. Dicrotophos
11. Phorate
12. Monocrotophos
13. Demeton
14. Terbuphos
15. Diazinon
16. Dimethoate
17. Fonofos
18. Phosphamidon isomer
19. Disulfoton
20. Dichlofenthion
21. Phosphamidon
22. Chlorpyrifos methyl
23. Ronnel
24. Aspon
25. Methyl parathion
26. Malathion
27. Fenitrothion
28. Chlorpyrifos
29. Fenthion
30. Trichloronate
31. Parathion
32. Merphos
33. Chlorfenvinphos
34. Crotoxyphos
35. Stirofos
36. Tokuthion
37. Merphos oxide (tribufos)
38. Ethion
39. Fensulfothion
40. Contaminant
41. Carbophenothion
42. Famfur
43. EPN
44. Phosmet
45. Leptophos
46. Azinphos methyl
47. Azinphos ethyl
48. Couphomos

Nitrogen and Phosphorous Pesticides

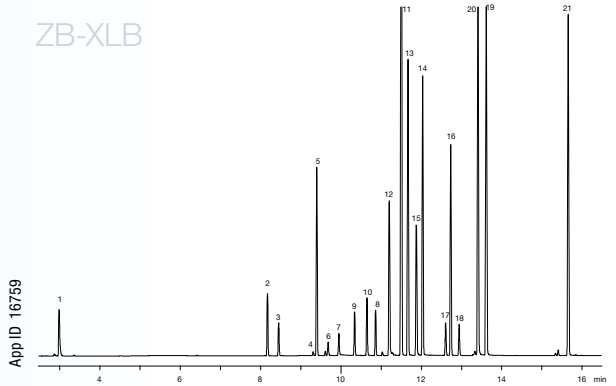
Please inquire about conditions

ZB-5MSi



Chlorinated Herbicides

ZB-XLB



Conditions for Chlorinated Herbicides (App ID 16759) on ZB-XLB

Dimensions: 30 meter x 0.32 mm x 0.25 µm
Injection: Splitless @ 250 °C, 1 µL
Carrier Gas: Helium @ 2.4 mL/min (constant flow)
Oven Program: 50 °C for 0.5 min to 100 °C @ 25 °C/min to 320 °C @ 12 °C/min for 2 min
Detector: ECD @ 300 °C
Sample: Analytes at 0.5 ppm in Hexane

1. Dalapon
2. 3,5-Dichlorobenzoic acid
3. 4-Nitrophenol
4. DCAA (Surr)
5. Dicamba
6. MCPP
7. MCPA
8. DBOB (IS)
9. Dichloroprop
10. 2,4-D
11. Pentachlorophenol
12. Contaminant
13. Silvex
14. 2,4,5-T
15. Chloramben
16. Dinoseb
17. 2,4-DB
18. Bentazone
19. Picloram
20. DCPA
21. Acifluorfen

Polynuclear Aromatic Hydrocarbons (PAHs)

Sharp Peak Shapes with Quality HPLC Columns

- Synergi™ Max-RP provides high efficiency and narrow peaks with a unique C12 bonded phase
- Envirosep™-PP gives additional separation of difficult compounds

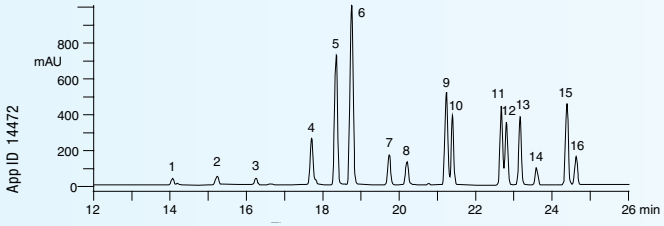
High Recovery and Clean Extracts with Strata™-X SPE Sorbent

Compound	Concentration (ng/mL)	% Recovery	% RSD (n=3)
Fluoranthene	100	92	5.73
Pyrene	100	89	5.58
Benz[a]anthracene	100	82	2.55
Chrysene	100	67	3.99
Benzo[b]fluoranthene	100	81	3.10
Benzo[a]pyrene	100	79	3.59

SPE Method

Sorbent: Strata-X, 60 mg/3 mL
Part No.: 8B-S100-UBJ
Condition: 2 mL dichloromethane, followed by 2 mL methanol, followed by 2 mL water
Load: 10 mL tap water spiked with analytes
Wash 2 mL D. I. Water
Dry: 2 min under vacuum
Elute: 2 x 2 mL dichloromethane
Reconstitute: Spike 100 µL of 20 µg/mL benzo[g,h,i] perylene and dry down under N_2 @ 40 °C
Reconstitute: Add 100 µL dichloromethane

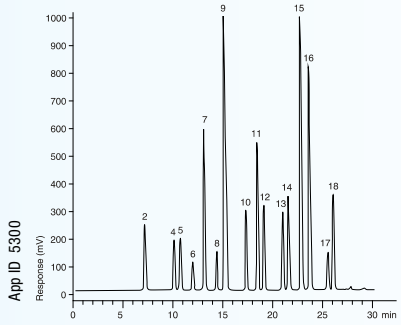
PAHs in Drinking Water



Column: Synergi 4 µm Max-RP
Dimensions: 250 x 4.6 mm
Part No. : 00G-4337-E0
Mobile Phase: A = Water, B = Acetonitrile
Gradient: A/B (65:35) hold 2 min to A/B (0:100) in 24 min. Hold 10 min
Flow Rate: 1.5 mL/min
Detection: UV @ 254 nm
Temperature: Ambient
Sample:

1. Naphthalene
2. Acenaphthylene
3. Acenaphthene
4. Fluorene
5. Phenanthrene
6. Anthracene
7. Fluoranthene
8. Pyrene
9. Benz[a]anthracene
10. Chrysene
11. Benzo[b]fluoranthene
12. Benzo[k]fluoranthene
13. Benzo[a]pyrene
14. Dibenzo[a,h]anthracene
15. Benzo[g,h,i]perylene
16. Indeno[1,2,3-cd]pyrene

PAHs with Surrogate Standards



Column: EnviroSep™-PP
Dimensions: 125 x 4.6 mm
Part No. : 00E-3029-E0
Mobile Phase: A = Water, B = Acetonitrile
Gradient: A/B (60:40) to A/B (0:100) in 25 min
Flow Rate: 2 mL/min
Detection: Programmed fluorescence; 0 minutes Exλ: 240 nm Emλ: 425 nm; 16 minutes Exλ: 254 nm Emλ: 395 nm
Sample: 16 component PAH mixture with 3 surrogates, 20 µL

1. Naphthalene
2. Acenaphthene
3. Flourene
4. Phenanthrene
5. Anthracene
6. Fluoranthene
7. Pyrene
8. p-Terphenyl*
9. Benz[a]anthracene
10. Chrysene
11. Benzo[e]pyrene*
12. Benzo[b]fluoranthene
13. Benzo[k]fluoranthene
14. Benzo[a]pyrene
15. Dibenzo[a,h]anthracene
16. Benzo[g,h,i]perylene

*Surrogate Standards

Specialized Solutions for Aromatic Compounds

Polynuclear Aromatic Hydrocarbons (PAHs) are a class of persistent organic pollutants (POPs) that are carcinogenic and mutagenic in humans. Due to their potential health risk at low levels, PAH

Polynuclear Aromatic Hydrocarbons (PAHs)

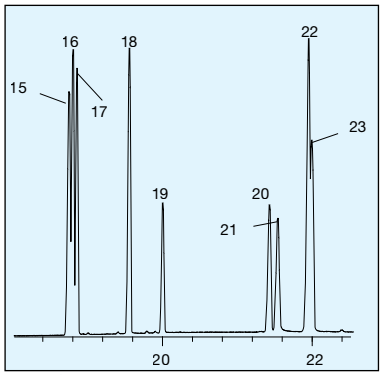
Enhanced Resolution of PAHs on Zebron™ ZB-5ms

- Arylene backbone provides great separation of aromatic PAH isomers
- Enhanced resolution of Benzo[b] and Benzo[k]fluoranthene isomers
- Low bleed levels allow for maximum MS sensitivity
- Run time cut in half by using the fast GC dimensions

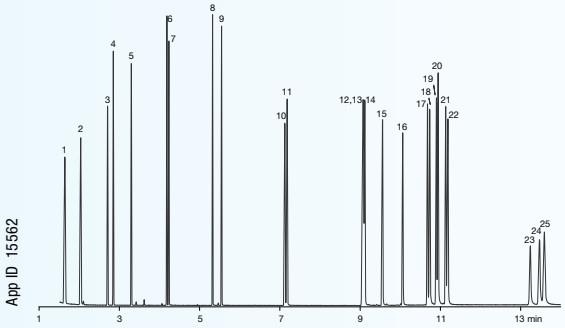
testing is required for many different types of products. Phenomenex offers solutions for both GC and HPLC analysis techniques depending on the needs of a laboratory.

Time Saving Tip

Use a Zebron™ Guardian™ column to further protect your column and extend its lifetime. This out-of-the-box, built-in solution will trap contaminates and prevent stationary phase damage. Guaranteed not to leak, it eliminates the need for glass tubing, which will contract and expand during the oven cycle.



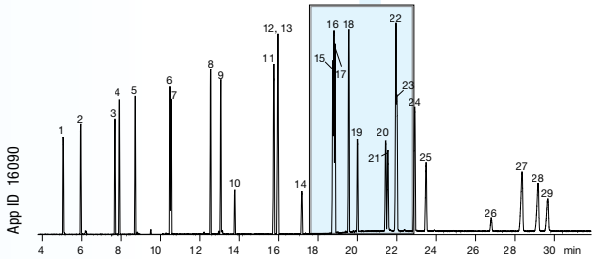
Polynuclear Aromatic Hydrocarbons (PAHs)



Column: Zebron ZB-5ms
Dimensions: 20 meter x 0.18 mm x 0.18 µm
Part No. : 7FD-G010-08
Injection: Split 15:1 @ 285 °C, 1 µL
Carrier Gas: Helium @ 1.2 mL/min (constant flow)
Oven Program: 130 °C for 0.5 min to 250 °C @ 25 °C/min to 270 °C @ 6 °C/min to 320 °C @ 25 °C/min for 4 min
Detector: MSD @ 180 °C
Sample:

1. Naphthalene
2. 2-Methylnaphthalene
3. Acenaphthalene
4. Acenaphthene
5. Fluorene
6. Phenanthrene
7. Anthracene
8. Fluoranthene
9. Pyrene
10. Benz[a]anthracene
11. Chrysene
12. Benzo[b]fluoranthene
13. Benzo[j]fluoranthene
14. Benzo[k]fluoranthene
15. Benzo[a]pyrene
16. 3-Methylcholanthrene
17. Dibenz[a,h]acridine
18. Dibenz[a,j]acridine
19. Indeno[1,2,3-cd]pyrene
20. Dibenz[a,h]anthracene
21. 7H-Dibenzo[c,g]carbazole
22. Benzo[g,h,i]perylene
23. Dibenzo[a,e]pyrene
24. Dibenzo[a,i]pyrene
25. Dibenzo[a,j]pyrene

PAHs



Column: Zebron ZB-50
Dimensions: 30 meter x 0.25 mm x 0.25 µm
Part No.: 7HG-G004-11
Injection: Pulsed Splitless for 0.5 min @ 320 °C, 1 µL
Carrier Gas: Helium @ 1.2 mL/min (constant flow)
Oven Program: 80 °C to 265 °C @ 15 °C/min to 290 °C @ 5 °C/min to 330 °C at 20 °C/min for 15 min
Detector: MSD @ 330 °C; 45-450 amu
Sample:

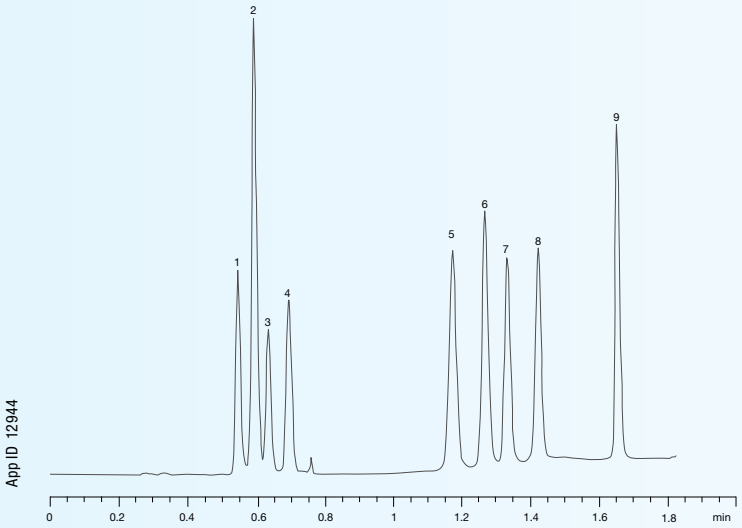
1. Naphthalene
2. 2-Methylnaphthalene
3. Acenaphthalene
4. Acenaphthene
5. Fluorene
6. Phenanthrene
7. Anthracene
8. Fluoranthene
9. Pyrene
10. Benzo[c]fluorene
11. Benz[a]anthracene
12. Chrysene
13. Cyclopenta[c,d]pyrene
14. 5-Methylchrysene
15. Benzo[b]fluoranthene
16. Benzo[k]fluoranthene
17. Benzo[j]fluoranthene
18. Benzo[a]pyrene
19. 3-Methylcholanthrene
20. Dibenz[a,h]acridine
21. Dibenz[a,j]acridine
22. Dibenz[a,h]anthracene
23. Indeno[1,2,3-cd]pyrene
24. Benzo[g,h,i]perylene
25. 7H-Dibenzo[c,g]carbazole
26. Dibenzo[a,l]pyrene
27. Dibenzo[a,e]pyrene
28. Dibenzo[a,i]pyrene
29. Dibenzo[a,h]pyrene

Carbamate Pesticides by HPLC

Great Peak Shape with Luna® CN HPLC Columns

- One of the most stable CN (Cyano) columns under both reversed phase or normal phase conditions
- Reproducible from run-to-run, column-to-column, batch-to-batch
- pH stable from 1.5 to 7.0

Carbamate / Urea and Triazine Pesticides



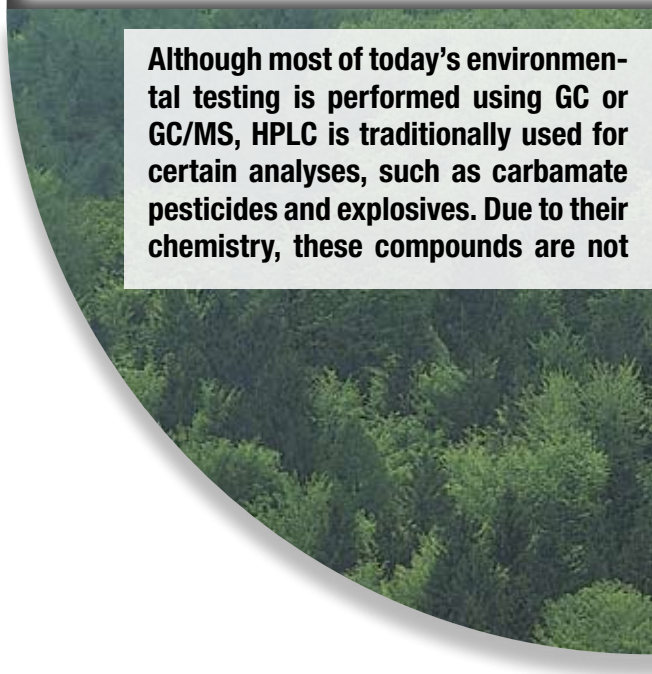
Column: Luna 3 µm CN 100 Å
Dimensions: 100 x 4.6 mm
Part No.: 00D-4254-E0
Mobile Phase: A = Hexane, B = 80:20 Methylene chloride:Methanol
Gradient: A/B (95:5) hold 0.5 min to A/B (75:25) in 0.5 min
Flow Rate: 5 mL/min
Temperature: Ambient
Detector: UV @ 254 nm
Sample:
1. Prometryn
2. Propazine
3. Ametryn
4. Atrazine
5. Carbofuran
6. Barban
7. Carbaryl
8. Tebuthiuron
9. Diuron

High Recovery and Clean Extracts with Strata™-X SPE Sorbent

Compound	Concentration (µg/mL)	% Recovery	% RSD (n=3)
Fenuron	0.5	102	2.67
Monuron	0.5	108	1.88
Forchlorfenuron	0.5	75	3.45
Diuron	0.5	99	2.09
Siduron	0.5	91	0.92

SPE Method:
Sorbent: Strata-X, 60 mg/3 mL
Part No.: 8B-S100-UBJ
Condition: 2 mL dichloromethane, followed by 2 mL acetonitrile, followed by 2 mL water
Load: 2 mL tap water (spiked with analytes)
Wash: 2 mL D. I. Water
Dry: 2 min under vacuum
Elute: 2 mL of acetonitrile/dichloromethane (1:1)
Reconstitute: Spike 50 µL of linuron (20.0 µg/mL) and dry down under N_2 @ 40 °C
Reconstitute: Add 200 µL water

Carbamate Pesticides and Explosives by HPLC



Although most of today's environmental testing is performed using GC or GC/MS, HPLC is traditionally used for certain analyses, such as carbamate pesticides and explosives. Due to their chemistry, these compounds are not

Explosives by HPLC

Improved Recovery of Explosives with Quality HPLC Columns

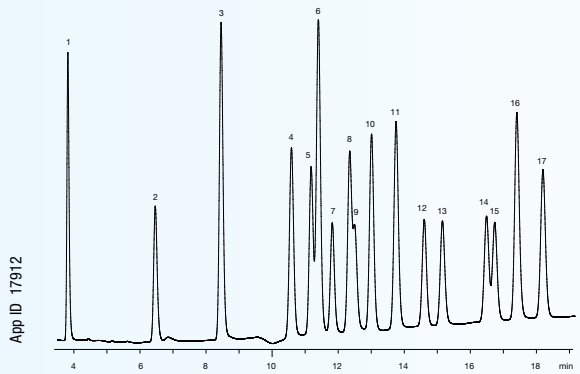
- Synergi™ Hydro-RP incorporates polar selectivity with strong hydrophobic retention
- Luna Phenyl-Hexyl provides orthogonal aromatic selectivity for confirmation of explosives

Time Saving Tip

Use Strata SDB-L for effective sample preparation of explosives.

readily analyzed by GC. Carbamates are unstable under heat and are not volatile. In addition, some explosives and related compounds, such as picric acid are also not easily detected by GC.

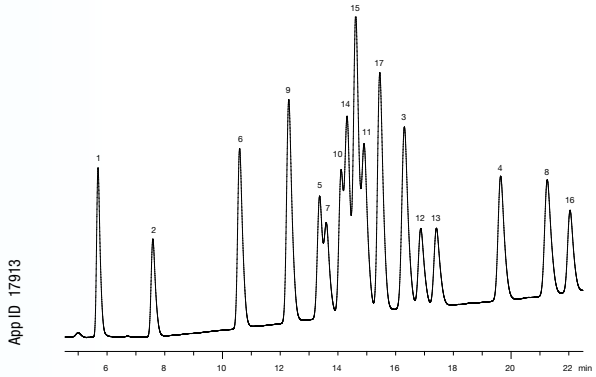
Explosive Mix Using Synergi Hydro-RP



Column: Synergi 4 µm Hydro-RP 80 Å
Dimensions: 250 x 4.6 mm
Part No.: 00G-4375-E0
Mobile Phase: A = Methanol, B = Water
Gradient: A/B (55:45) hold 2 min to A/B (75:25) in 20 min then A/B (55:45) hold 3 min
Flow Rate: 1 mL/min
Temperature: 25 °C
Detector: UV @ 254 nm
Sample: 100 µL of 100 µg/mL 17 component mix was diluted with 900 µL of 50:50 methanol/water

1. Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)
2. Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)
3. 1,3,5-Trinitrobenzene (1,3,5-TNB)
4. Methyl-2,4,6-trinitrophenylnitramine (Tetryl)
5. 1,3-Dinitrobenzene (1,3-DNB)
6. Nitrobenzene (NB)
7. Nitroglycerin (NG)
8. 2,4,6-Trinitrotoluene (2,4,6-TNT)
9. 3,5-Dinitroaniline (3,5-DNA)
10. 4-Amino-2,6-dinitrotoluene (4-Am-DNT)
11. 2-Amino-4,6-dinitrotoluene (2-Am-DNT)
12. 2,6-Dinitrotoluene (2,6-DNT)
13. 2,4-Dinitrotoluene (2,4-DNT)
14. Pentaerythritol tetranitrate (PETN)
15. 2-Nitrotoluene (2-NT)
16. 4-Nitrotoluene (4-NT)
17. 3-Nitrotoluene (3-NT)

Explosive Mix Using Luna Phenyl-Hexyl



Column: Luna 5 µm Phenyl-Hexyl 100 Å
Dimensions: 250 x 4.6 mm
Part No.: 00G-4257-E0
Mobile Phase: A = Methanol, B = Water
Gradient: A/B (55:45) hold 2 min to A/B (75:25) in 20 min then A/B (55:45) hold 3 min
Flow Rate: 1 mL/min
Temperature: 38 °C
Detector: UV @ 254 nm
Sample:

1. Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)
2. Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)
3. 1,3,5-Trinitrobenzene (1,3,5-TNB)
4. Methyl-2,4,6-trinitrophenylnitramine (Tetryl)
5. 1,3-Dinitrobenzene (1,3-DNB)
6. Nitrobenzene (NB)
7. Nitroglycerin (NG)
8. 2,4,6-Trinitrotoluene (2,4,6-TNT)
9. 3,5-Dinitroaniline (3,5-DNA)
10. 4-Amino-2,6-dinitrotoluene (4-Am-DNT)
11. 2-Amino-4,6-dinitrotoluene (2-Am-DNT)
12. 2,6-Dinitrotoluene (2,6-DNT)
13. 2,4-Dinitrotoluene (2,4-DNT)
14. Pentaerythritol tetranitrate (PETN)
15. 2-Nitrotoluene (2-NT)
16. 4-Nitrotoluene (4-NT)
17. 3-Nitrotoluene (3-NT)

Volatile Organics (VOCs) by GC/MS

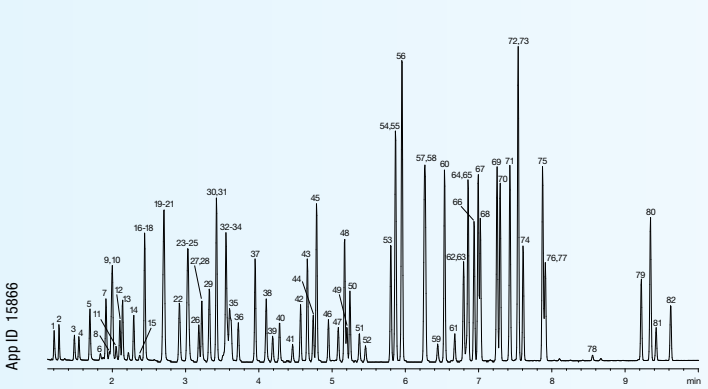
High Resolution of VOCs with Zebron™ ZB-624

- Specially designed low bleed phase for analysis of VOCs
- Available in fast GC dimensions for increased sample throughput

Time Saving Tip

Want to speed up your analysis? Run your method on a 20 meter Zebron™ ZB-624 to get a run time less than 10 minutes!

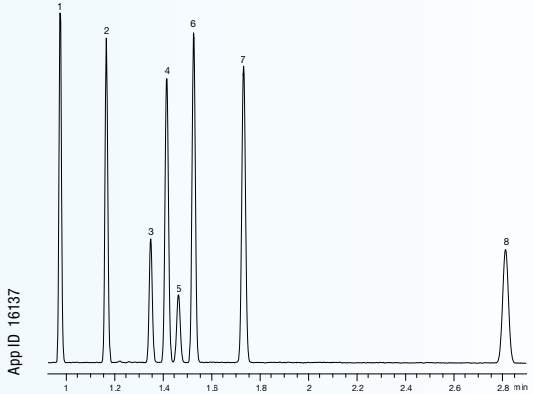
Volatile Organics



Column: Zebron ZB-624
Dimensions: 20 meter x 0.18 mm x 1.00 µm
Part No.: 7FD-G005-22
Injection: Purge and Trap
Carrier Gas: Helium (constant flow)
Oven Program: 35 ˚C to 210 ˚C
Detector: MSD; 35-275 amu
Sample:

1. Chloromethane
2. Vinyl chloride
3. Bromomethane
4. Chloroethane
5. Trichlorofluoromethane
6. Ethanol
7. Dichlorotrifluoroethane
8. Acrolein
9. Trichlorotrifluoroethane
10. 1, 1-Dichloroethene
11. Acetone
12. Methyl iodide
13. Carbon disulfide
14. Methylene chloride
15. t-Butanol
16. trans-1,2-Dichloroethane
17. Methyl-t-butyl ether
18. Acrylonitrile
19. 1, 1-Dichloroethane
20. Vinyl Acetate
21. Diisopropyl ether
22. Ethyl-t-butyl ether
23. 2, 2-Dichloropropane
24. cis-1, 2-Dichloroethene
25. 2-Butanone
26. Bromochloromethane
27. Chloroform
28. Tetrahydrofuran
29. 1, 1, 1-Trichloroethane
30. 1, 1-Dichloropropene
31. Carbon tetrachloride
32. 1, 2-Dichloroethane-d4
33. Benzene
34. 1, 2-Dichloroethane
35. t-Amyl methyl ether
36. Fluorobenzene
37. Trichloroethene
38. 1, 2-Dichloropropane
39. Dibromomethane
40. Bromodichloromethane
41. 2-Chloroethylvinyl ether
42. cis-1, 3-Dichloropropene
43. Methyl isobutyl ketone
44. Toluene-d8
45. Toluene
46. trans-1, 3-Dichloropropene
47. 1, 1, 2-Trichloroethane
48. Tetrachloroethene
49. 1, 3-Dichloropropane
50. 2-Hexanone
51. Dibromochloromethane
52. Ethylene dibromide
53. Chlorobenzene
54. 1, 1, 1, 2-Tetrachloroethane
55. Ethylbenzene
56. m,p-Xylene
57. o-Xylene
58. Styrene
59. Bromoform
60. Isopropylbenzene
61. 4-Bromofluorobenzene
62. 1, 1, 2, 2-Tetrachloroethane
63. Bromobenzene
64. 1, 2, 3-Trichloropropane
65. n-Propylbenzene
66. 2-Chlorotoluene
67. 1, 3, 5-Trimethylbenzene
68. 4-Chlorotoluene
69. tert-Butylbenzene
70. 1, 2, 4-Trimethylbenzene
71. sec-Butylbenzene
72. 1, 3-Dichlorobenzene
73. 4-Isopropyltoluene
74. 1, 4-Dichlorobenzene
75. n-Butylbenzene
76. 1, 2-Dichlorobenzene-d4
77. 1, 2-Dichlorobenzene
78. 1, 2-Dibromo-3-chloropropane
79. 1, 2, 4-Trichlorobenzene
80. Hexachlorobutadiene
81. Naphthalene
82. 1, 2, 3-Trichlorobenzene

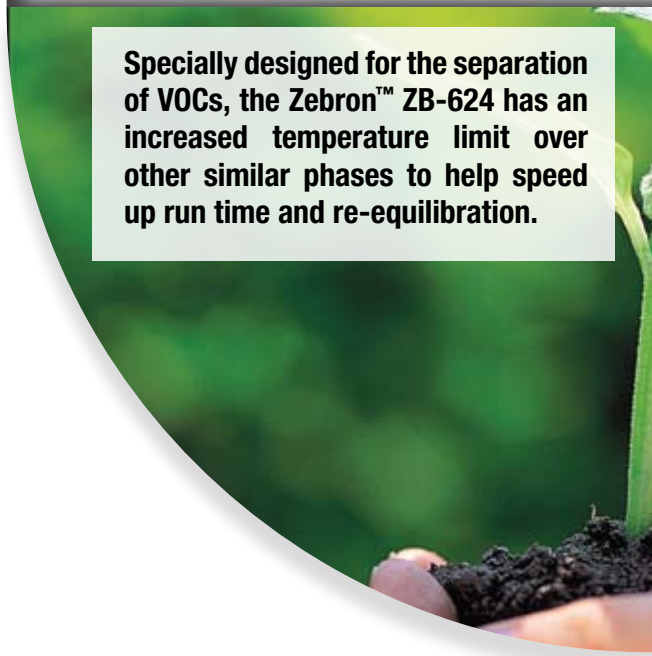
European Red List Volatiles



Column: Zebron ZB-624
Dimensions: 20 meter x 0.18 mm x 1.00 µm
Part No.: 7FD-G005-22
Injection: Split 50:1 @ 250 °C, 1 µL
Carrier Gas: Helium @ 1.5 mL/min (constant flow)
Oven Program: 90 ºC Isothermal
Detector: FID @ 260 °C
Sample: Static Headspace: 8 µL of 12.5 % volatiles mix sample in a 0.18 mL limited volume insert inside a 2.0 mL vial

1. 1,1-Dichloroethylene
2. 1,1-Dichloroethane
3. Chloroform
4. 1,1,1-Trichloroethane
5. Carbon tetrachloride
6. 1,2-Dichloroethane
7. Trichloroethylene
8. Tetrachloroethylene

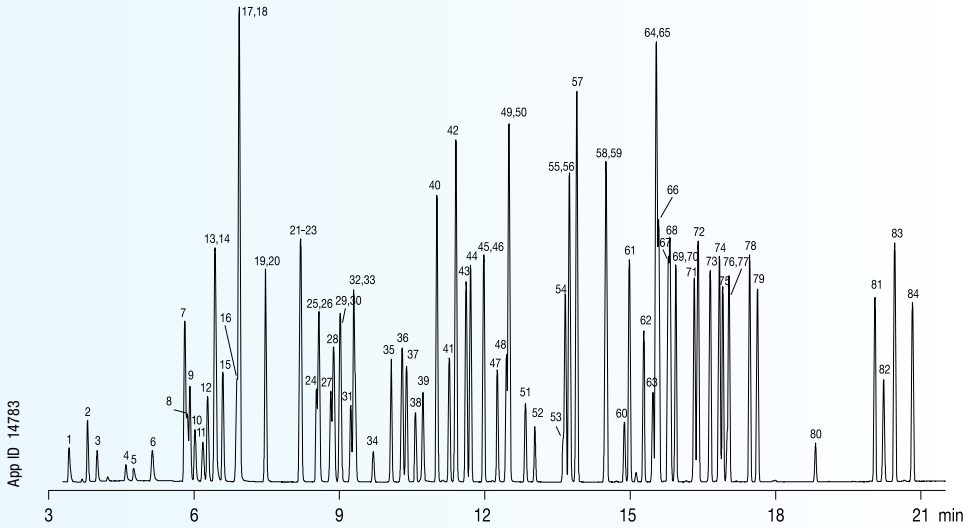
Volatile Organics (VOCs) by GC/MS



Specially designed for the separation of VOCs, the Zebron™ ZB-624 has an increased temperature limit over other similar phases to help speed up run time and re-equilibration.

Volatile Organics (VOCs) by GC/MS

Volatile Organics



Column: Zebron™ ZB-624
Dimensions: 60 meter x 0.25 mm x 1.4 µm
Part No: 7KG-G005-27
Injection: Purge and Trap 30:1 @ 250 °C, 1 µL
Oven Program: 40 °C for 2 min to 225 °C @ 10 °C/min for 3.5 min
Carrier Gas: Helium @ 1.1 mL/min (constant flow)
Detector: MSD @ 180 °C

Compound list of chemicals included in this analysis.

Peak #	Compound Name	t_R
1	Dichlorodifluoromethane	3.43
2	Chloromethane	3.80
3	Vinyl chloride	4.00
4	Bromomethane	4.61
5	Chloroethane	4.77
6	Trichlorofluoromethane	5.15
7	Acrolein	5.81
8	1,1,2-Trichloro-1,2,2-Trifluoroethane	5.86
9	1,1-Dichloroethene	5.92
10	Acetone	6.02
11	Iodomethane	6.19
12	Carbon disulfide	6.28
13	Methyl Acetate	6.42
14	Acetonitrile	6.43
15	Methylene chloride	6.59
16	t-Butyl Methyl Ether	6.89
17	trans-1,2-Dichloroethene	6.93
18	Acrylonitrile	6.94
19	1,1-Dichloroethane	7.48
20	Vinyl Acetate	7.48
21	2,2-Dichloropropane	8.19
22	2-Butanone	8.20
23	cis-1,2-Dichloroethene	8.21
24	Bromochloromethane	8.53
25	Tetrahydrofuran	8.58
26	Chloroform	8.58
27	1,1,1-Trichloroethane	8.82
28	Cyclohexane	8.88
29	Carbon tetrachloride	9.02
30	1,1-Dichloropropene	9.02
31	1,2-Dichloroethane-d4 (surr)	9.23
32	Benzene	9.30
33	1,2-Dichloroethane	9.33
34	1,4-Difluorobenzene (IS)	9.70
35	Trichloroethene	10.07
36	Methylcyclohexane	10.30
37	1,2-Dichloropropane	10.38
38	Dibromomethane	10.57
39	Bromodichloromethane	10.73
40	2-Chloroethylvinyl Ether	11.01
41	cis-1,3-Dichloropropene	11.27
42	4-Methyl-2-pentanone	11.41
43	Toluene-d8 (surr)	11.61
44	Toluene	11.70
45	trans-1,3-Dichloropropene	11.98
46	Ethyl Methacrylate	11.98
47	1,1,2-Trichloroethane	12.26
48	Tetrachloroethene	12.45
49	1,3-Dichloropropane	12.50
50	2-Hexanone	12.50
51	Dibromochloromethane	12.84
52	1,2-Dibromoethane	13.04
53	Chlorobenzene-d5 (IS)	13.62
54	Chlorobenzene	13.66
55	Ethylbenzene	13.74
56	1,1,1,2-Tetrachloroethane	13.76
57	m,p-Xylene	13.90
58	o-Xylene	14.49
59	Styrene	14.51
60	Bromoform	14.88
61	Isopropylbenzene	14.98
62	p-Bromofluorobenzene (surr)	15.28
63	1,1,2,2-Tetrachloroethane	15.47
64	Bromobenzene	15.54
65	trans-1,4-Dichloro-2-Butene	15.54
66	1,2,3-Trichloropropane	15.57
67	n-Propylbenzene	15.79
68	1,3,5-Trimethylbenzene	15.85
69	2-Chlorotoluene	15.94
70	4-Chlorotoluene	15.94
71	tert-Butylbenzene	16.32
72	1,2,4-Trimethylbenzene	16.40
73	sec-Butylbenzene	16.65
74	4-Isopropyltoluene	16.84
75	1,3-Dichlorobenzene	16.91
76	1,4-Dichlorobenzene-d4 (IS)	17.00
77	1,4-Dichlorobenzene	17.04
78	n-Butylbenzene	17.47
79	1,2-Dichlorobenzene	17.62
80	1,2-Dibromo-3-Chloropropane	18.83
81	1,2,4-Trichlorobenzene	20.05
82	Hexachlorobutadiene	20.23
83	Naphthalene	20.46
84	1,2,3-Trichlorobenzene	20.82

Semi-Volatiles (SVOs) by GC/MS

Rapid Extraction and Cleanup of Semi-Volatiles

- Contaminant-free extraction with Strata®-SDB-L
- Reliable cleanup with Strata silica-based sorbents
- Consistent recoveries for various compound classes (amines, phenols, PAHs, etc)
- Reduce phthalate contamination by using Teflon® tubes
- Eliminate contaminates that often compromise analytical analysis

Experimental Conditions

Specimen Preparation: A 500 mL water sample spiked with the target compounds was acidified with glacial acetic acid (pH = 3.5). The concentration range of 30-75 ppm, consistent with practical quantitation limits for waste water in EPA Method 8270.

SPE Method:

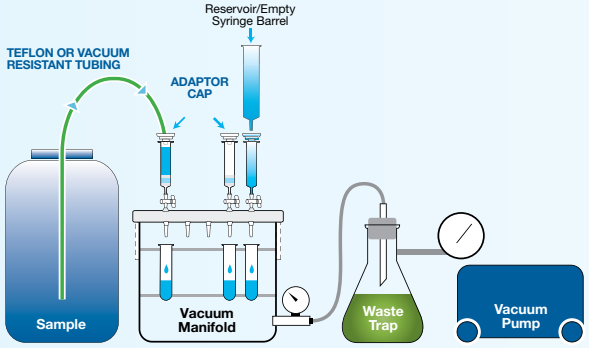
Condition: Add 5 mL methanol, followed by 5 mL deionized water

Load: Continually load 500 mL of sample onto the column using the vacuum manifold apparatus as shown in Figure 1

Elution: Elute with 5 mL acetone, followed by 5 mL methylene chloride. Collect all elution solvents in a single test tube

Analytes of Interest	Recommended Cleanup
Aniline & aniline derivatives	Florisil®
Phenols	Silica Gel, GPC
Phthalate esters	Alumina, Florisil, GPC
Nitrosamines	Alumina, Florisil, GPC
Organochlorine pesticides & PCBs	Alumina, Florisil, GPC
Nitroaromatics and cyclic ketones	Florisil, GPC
Polynuclear aromatic hydrocarbons	Alumina, Silica, GPC
Haloethers	Florisil, GPC
Chlorinated hydrocarbons	Florisil, GPC
Organophosphorus pesticides	Florisil

Large Volume Processing

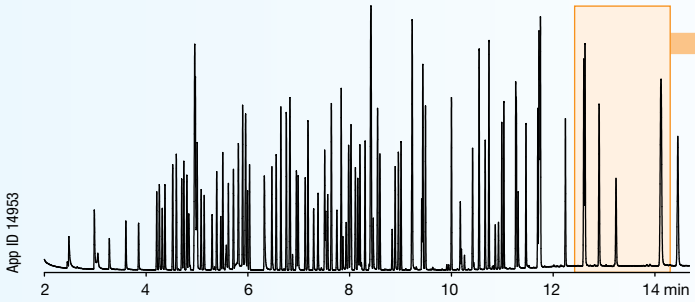


The large number of semi-volatile organic (SVO) compounds, their varying chemical properties, and the wide range of matrices they occur in, significantly complicate the GC analysis. Phenomenex Zebron ZB-5ms columns have a phenyl-arylene

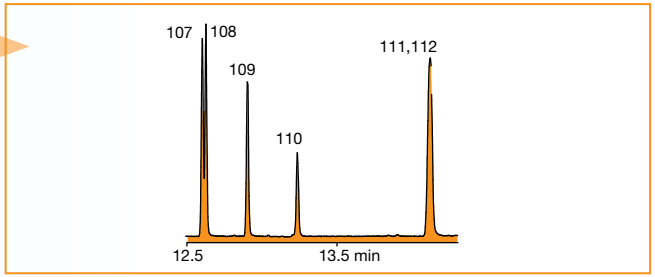
Semi-Volatiles (SVOs) by GC/MS

Great Sensitivity for Low Level Analysis with Zebron™ ZB-5ms

- Extremely low bleed phase that offers good sensitivity for low level analysis
- Enhanced phase stability leads to long column lifetime
- Stable response for pentachlorophenol and benzidine



. . . Results Done in 15 mins!



Column: Zebron ZB-5ms
Dimensions: 30 meter x 0.25 mm x 0.25 µm
Part No.: 7HG-G010-11
Injection: Split 10:1 @ 250 °C, 1 µL
Carrier Gas: Helium @ 1.4 mL/min (constant flow)
Oven Program: 40 °C for 0.5 min to 220 °C @ 22 °C/min to 325 °C @ 35 °C/min for 3 min
Detector: MSD @ 240 °C

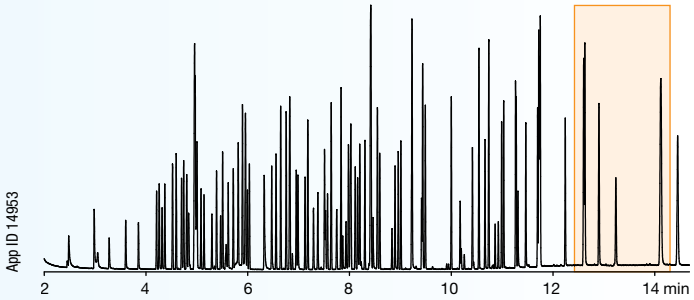
backbone that helps to separate the difficult isomers, such as Benzo[b] and Benzo[k]fluoranthene. The proprietary deactivation procedure improves peak shape for compounds such as Pentachlorophenol.

Conditions on next page

Semi-Volatiles (SVOs) by GC/MS

Continued from page 23

Column: Zebron ZB-5ms
Dimensions: 30 meter x 0.25 mm x 0.25 µm
Part No.: 7HG-G010-11
Injection: Split 10:1 @ 250 ˚C, 1 µL
Carrier Gas: Helium @ 1.4 mL/min (constant flow)
Oven Program: 40 ˚C for 0.5 min to 220 ˚C @ 22 ˚C/min to 325 ˚C @ 35 ˚C/min for 3 min
Detector: MSD @ 240 ˚C



Peak No.	Sample Analyte
1.	N-Nitrosodimethylamine
2.	Pyridine
3.	2-Picoline
4.	N-Nitrosomethylethylamine
5.	Methyl methanesulfonate
6.	N-Nitrosodiethylamine
7.	Ethyl methanesulfonate
8.	Phenol
9.	Aniline
10.	Bis(2-chloroethyl)ether
11.	2-Chlorophenol
12.	1,3-Dichlorobenzene
13.	1,4-Dichlorobenzene
14.	Benzyl Alcohol
15.	1,2-Dichlorobenzene
16.	2-Methylphenol
17.	Bis(chloroisopropyl)ether
18.	N-Nitrosypyrrolidone
19.	3-Methylphenol; 4-Methylphenol
20.	N-Nitroso-di-n-propylamine
21.	Acetophenone
22.	N-Nitrosomorpholine
23.	2-Toluidine
24.	Hexachloroethane
25.	Nitrobenzene
26.	N-Nitrosopiperidine
27.	Isophorone
28.	2-Nitrophenol
29.	2,4-Dimethylphenol

Peak No.	Sample Analyte
30.	Benzoic Acid
31.	Bis(2-chloroethoxy)methane
32.	2,4-Dichlorophenol
33.	1,2,4-Trichlorobenzene
34.	Naphthalene
35.	α,α-dimethylphenylamine
36.	4-Chloroaniline
37.	2,6-Dichlorophenol
38.	Hexachloropropene
39.	Hexachloro-1,3-butadiene
40.	N-Nitrosodibutylamine
41.	1,4-Phenylenediamine
42.	4-Chloro-3-methylphenol
43.	Safrole
44.	1-Methylnaphthalene
45.	2-Methylnaphthalene
46.	Hexachlorocyclopentadiene
47.	1,2,4,5-Tetrachlorobenzene
48.	Isosafrole (isomer)
49.	2,4,6-Trichlorophenol
50.	2,4,5-Trichlorophenol
51.	Isosafrole (isomer)
52.	2-Chloronaphthalene
53.	2-Nitroaniline
54.	1,4-Naphthoquinone
55.	Dimethyl phthalate
56.	1,3-Dinitrobenzene
57.	2,6-Dinitrotoluene
58.	Acenaphthylene

Peak No.	Sample Analyte
59.	3-Nitroaniline
60.	Acenaphthene
61.	2,4-Dinitrophenol
62.	4-Nitrophenol
63.	Pentachlorobenzene
64.	2,4-Dinitrotoluene
65.	Dibenzofuran
66.	1-Naphthalenamine
67.	2,3,4,6-Tetrachlorophenol
68.	2-Naphthalenamine
69.	Diethyl Phthalate
70.	Fluorene
71.	2-Methyl-5-nitroaniline
72.	4-Chlorophenyl phenyl ether
73.	4-Nitroaniline
74.	4,6-Dinitro-2-methylphenol
75.	Diphenylamine
76.	Azobenzene
77.	1,3,5-Trinitrobenzene
78.	Phenacetin
79.	4-Bromophenyl phenyl ether
80.	Hexachlorobenzene
81.	Pentachlorophenol
82.	4-Aminobiphenyl
83.	Pentachloronitrobenzene
84.	Dinoseb
85.	Phenanthrene
86.	Anthracene
87.	Dibutyl phthalate

Peak No.	Sample Analyte
88.	4-Nitroquinoline-n-oxide
89.	Methapyriline
90.	Isodrin
91.	Fluoranthene
92.	Benzidine
93.	Pyrene
94.	Aramite
95.	Aramite (isomer)
96.	Dimethylaminoazobenzene
97.	Chlorobenzilate
98.	3,3-dimethylbenzidine
99.	Benzyl butyl phthalate
100.	Kepone
101.	2-Acetylaminofluorene
102.	3,3'-Dichlorobenzidine
103.	Benz[a]anthracene
104.	Bis(2-ethylhexyl) phthalate
105.	Chrysene
106.	Di-n-octyl phthalate
107.	Benzo[b]fluoranthene
108.	Benzo[k]fluoranthene
109.	Benzo[a]pyrene
110.	3-Methylcholanthrene
111.	Indeno[1,2,3-cd]pyrene
112.	Dibenz[a,h]anthracene
113.	Benzo[g,h,i]perylene

Ordering Information

Sample Preparation / SPE Products

GC Columns and Accessories

HPLC Columns

Sample Preparation / SPE Products

Strata C18-E

Format	Sorbent Mass	Part Number	Unit	Price
Tube				
	50 mg	8B-S001-DAK	1 mL (100/box)	
	100 mg	8B-S001-EAK	1 mL (100/box)	
	100 mg	8B-S001-EBJ	3 mL (50/box)	
	200 mg	8B-S001-FBJ	3 mL (50/box)	
	500 mg	8B-S001-HBJ	3 mL (50/box)	
	500 mg	8B-S001-HCH	6 mL (30/box)	
Giga™ Tube				
	500 mg	8B-S001-HDG	12 mL (20/box)	
	2 g	8B-S001-KDG	12 mL (20/box)	
	5 g	8B-S001-LEG	20 mL (20/box)	
	10 g	8B-S001-MFF	60 mL (16/box)	
	20 g	8B-S001-VFF	60 mL (16/box)	
	50 g	8B-S001-YSN	150 mL (8/box)	
	70 g	8B-S001-ZSN	150 mL (8/box)	

Strata Silica (Si-1)

Format	Sorbent Mass	Part Number	Unit	Price
Tube				
	100 mg	8B-S012-EAK	1 mL (100/box)	
	200 mg	8B-S012-FBJ	3 mL (50/box)	
	500 mg	8B-S012-HBJ	3 mL (50/box)	
	500 mg	8B-S012-HCH	6 mL (30/box)	
	1 g	8B-S012-JCH	6 mL (30/box)	
Giga™ Tube				
	500 mg	8B-S012-HDG	12 mL (20/box)	
	2 g	8B-S012-KDG	12 mL (20/box)	
	5 g	8B-S012-LEG	20 mL (20/box)	
	10 g	8B-S012-MFF	60 mL (16/box)	
	20 g	8B-S012-VFF	60 mL (16/box)	
	50 g	8B-S012-YSN	150 mL (8/box)	
	70 g	8B-S012-ZSN	150 mL (8/box)	

Strata EPH (specialty phase)

Format	Sorbent Mass	Part Number	Unit	Price
Tube				
	500 mg	8B-S031-HBJ	3 mL (50/box)	
Giga™ Tube				
	5 g	8B-S031-LEG	20 mL (20/box)	
Teflon Giga™ Tube				
	5 g	8B-S031-LEG-T	20 mL (20/box)	

Strata C8

Format	Sorbent Mass	Part Number	Unit	Price
Tube				
	100 mg	8B-S005-EAK	1 mL (100/box)	
	200 mg	8B-S005-FBJ	3 mL (50/box)	
	500 mg	8B-S005-HBJ	3 mL (50/box)	
	500 mg	8B-S005-HCH	6 mL (30/box)	
	1 g	8B-S005-JCH	6 mL (30/box)	
Giga™ Tube				
	2 g	8B-S005-KDG	12 mL (20/box)	
	5 g	8B-S005-LEG	20 mL (20/box)	
	10 g	8B-S005-MFF	60 mL (16/box)	

Strata Florisil® (FL-PR) (pesticide residue grade)

Format	Sorbent Mass	Part Number	Unit	Price
Tube				
	500 mg	8B-S013-HBJ	3 mL (50/box)	
	500 mg	8B-S013-HCH	6 mL (30/box)	
	1 g	8B-S013-JCH	6 mL (30/box)	
Giga™ Tube				
	2 g	8B-S013-KDG	12 mL (20/box)	
	5 g	8B-S013-LEG	20 mL (20/box)	
	10 g	8B-S013-MFF	60 mL (16/box)	

Strata-X

Format	Sorbent Mass	Part Number	Unit	Price
Tube				
	30 mg	8B-S100-TAK	1 mL (100/box)	
	60 mg	8B-S100-UBJ	3 mL (50/box)	
	200 mg	8B-S100-FBJ	3 mL (50/box)	
	500 mg	8B-S100-HBJ	3 mL (50/box)	
	100 mg	8B-S100-ECH	6 mL (30/box)	
	200 mg	8B-S100-FCH	6 mL (30/box)	
	500 mg	8B-S100-HCH	6 mL (30/box)	
Giga™ Tube				
	500 mg	8B-S100-HDG	12 mL (20/box)	
	1 g	8B-S100-JDG	12 mL (20/box)	
	1 g	8B-S100-JEG	20 mL (20/box)	
Teflon Tube				
	200 mg	8B-S100-FDG-T	12 mL (20/box)	

Strata SAX (strong anion exchange)

Format	Sorbent Mass	Part Number	Unit	Price
Tube				
	100 mg	8B-S008-EAK	1 mL (100/box)	
	100 mg	8B-S008-EBJ	3 mL (50/box)	
	200 mg	8B-S008-FBJ	3 mL (50/box)	
	500 mg	8B-S008-HBJ	3 mL (50/box)	
	500 mg	8B-S008-HCH	6 mL (30/box)	
	1 g	8B-S008-JCH	6 mL (30/box)	
Giga™ Tube				
	500 mg	8B-S008-HDG	12 mL (20/box)	
	2 g	8B-S008-KDG	12 mL (20/box)	
	5 g	8B-S008-LEG	20 mL (20/box)	
	10 g	8B-S008-MFF	60 mL (16/box)	
	20 g	8B-S008-VFF	60 mL (16/box)	

Strata® Alumina-N (AL-N)

Format	Sorbent Mass	Part Number	Unit	Price
Tube				
	500 mg	8B-S313-HBJ	3 mL (50/box)	
	1 g	8B-S313-JCH	6 mL (30/box)	
Giga™ Tube				
	2 g	8B-S313-KDG	12 mL (20/box)	

Strata SDB-L (styrene-divinylbenzene)

Format	Sorbent Mass	Part Number	Unit	Price
Tube				
	100 mg	8B-S014-EAK	1 mL (100/box)	
	200 mg	8B-S014-FBJ	3 mL (50/box)	
	500 mg	8B-S014-HBJ	3 mL (50/box)	
	500 mg	8B-S014-HCH	6 mL (30/box)	
	1 g	8B-S014-JCH	6 mL (30/box)	

Strata Eco-Screen

Format	Sorbent Mass	Part Number	Unit	Price
Tube				
	1 g	8B-S046-JBJ	3 mL (50/box)	

Contact Phenomenex for more information on product offerings and FREE samples.

Sepra Bulk Sorbents

Phase	100 g	Price	1 kg	Price
Reversed Phase				
C18-E	04G-4348	Inquire	04K-4348	
C18-T	04G-4405	Inquire	04K-4405	
C8	04G-4406	Inquire	04K-4406	
Phenyl	04G-4407	Inquire	04K-4407	
CN	04G-4409	Inquire	04K-4409	
SDB-L	04G-4412	Inquire	04K-4412	
Normal Phase				
Silica	04G-4410	Inquire	04K-4410	
FL-PR (Florisil® Pesticide Residue)	04G-4411	Inquire	04K-4411	
Ion Exchange				
SCX	04G-4413	Inquire	04K-4413	
SAX	04G-4414	Inquire	04K-4414	
NH_2	04G-4408	Inquire	04K-4408	

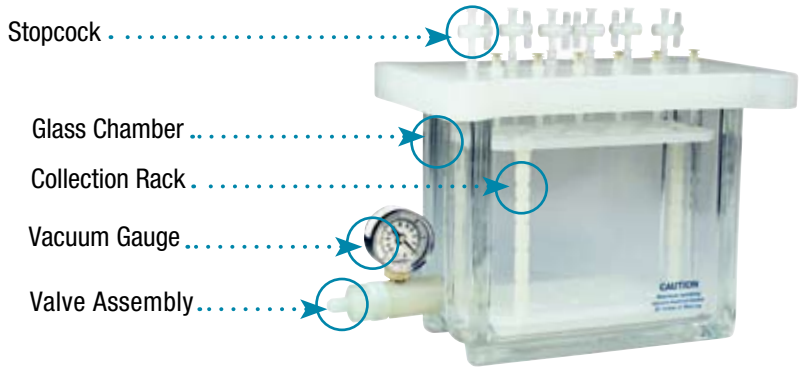
SPE Vacuum Manifolds

Part No.	Description	Unit	Price
24 – Position Vacuum Manifold*			
AH0-6024	SPE 24-Position Vacuum Manifold Set, complete assembly	ea	
12 – Position Vacuum Manifold*			
AH0-6023	SPE 12-Position Vacuum Manifold Set, complete assembly	ea	
10 - Position Tall-Boy™ Vacuum Manifold†			
AH0-7502	SPE 10-Position Tall-Boy Vacuum Manifold, complete assembly	ea	

General Vacuum Manifold Accessories

Part No.	Description	Unit	Price
AH0-7191	Adaptor Caps for 1, 3 and 6 mL SPE tubes, polyethylene, with Luer tip	15/pk	
AH0-7378	Adaptor Caps for 12, and 20 mL SPE tubes, polyethylene, with Luer tip	5/pk	
AH0-7379	Adaptor Caps for 60 mL SPE tubes, polyethylene, with Luer tip	5/pk	
AH0-6049	SPE Luer Stopcocks	24/pk	
AH0-6050	SPE Drying Attachment for 12-position manifold	ea	
AH0-6051	SPE Drying Attachment for 24-position manifold	ea	
AH0-6064	Teflon® Needles	100/pk	

Vacuum Manifolds for Processing Samples



- **Multiple sample processing saves time and money**
- **Female Luer inlets fit all male Luer tipped SPE tubes and cartridges**
- **Inert Teflon® and polypropylene flow path**
- **Glass chamber allows easy visual monitoring**
- **Adjustable racks accommodate a variety of test tubes, vials and flasks**

** Manifolds include: Vacuum-tight glass chamber, polypropylene lid with gasket, bleed valve and gauge, stopcock valves, collections racks, polypropylene needles*
† Recommended for elution volumes ≥ 25 mL

(1) The 10-position Tall Boy Vacuum Manifold Collection Rack includes 4 plates: one base plate, one dimple plate, one small plate and one large plate and three riser bar legs, along with 12 manifold clips to support the plates. The assembly also includes 10 polypropylene needles, 10 stopcocks and 4 black legs to support the lid when taken off the glass block.
(2) The 12-position Collection Rack consists of 3 support posts, bottom plate, 13 mm plate, 16 mm plate, autosampler plate, volumetric plate, and 12 retaining clips.
(3) The 24-position Collection Rack consists of 3 support posts, bottom plate, dimple plate, 13 mm plate, 16 mm plate, and 24 retaining clips.

Contact Phenomenex for additional manifold replacement parts.

GC Columns

ZB-5

- Rugged for general lab use

ID (mm)	df (µm)	Temp. Limits °C	Part No.	Price
15-Meter				
0.25	0.10	-60 to 360/370	7EG-G002-02	
0.25	0.25	-60 to 360/370	7EG-G002-11	
0.25	0.50	-60 to 360/370	7EG-G002-17	
0.25	1.00	-60 to 340/360	7EG-G002-22	
0.32	0.10	-60 to 360/370	7EM-G002-02	
0.32	0.25	-60 to 360/370	7EM-G002-11	
0.32	1.00	-60 to 340/360	7EM-G002-22	
0.53	0.50	-60 to 360/370	7EK-G002-17	
0.53	1.50	-60 to 340/360	7EK-G002-28	
0.53	3.00	-60 to 340/360	7EK-G002-36	
20-Meter				
0.18	0.18	-60 to 360/370	7FD-G002-08	
30-Meter				
0.25	0.10	-60 to 360/370	7HG-G002-02	
0.25	0.25	-60 to 360/370	7HG-G002-11	
0.25	0.50	-60 to 360/370	7HG-G002-17	
0.25	1.00	-60 to 340/360	7HG-G002-22	
0.32	0.10	-60 to 360/370	7HM-G002-02	
0.32	0.25	-60 to 360/370	7HM-G002-11	
0.32	0.50	-60 to 360/370	7HM-G002-17	
0.32	1.00	-60 to 340/360	7HM-G002-22	
0.53	0.50	-60 to 360/370	7HK-G002-17	
0.53	1.50	-60 to 340/360	7HK-G002-28	
0.53	3.00	-60 to 340/360	7HK-G002-36	
0.53	5.00	-60 to 340/360	7HK-G002-39	
60-Meter				
0.25	0.10	-60 to 360/370	7KG-G002-02	
0.25	0.25	-60 to 360/370	7KG-G002-11	
0.25	0.50	-60 to 360/370	7KG-G002-17	
0.25	1.00	-60 to 340/360	7KG-G002-22	
0.32	0.25	-60 to 360/370	7KM-G002-11	
0.32	1.00	-60 to 340/360	7KM-G002-22	
0.53	1.50	-60 to 340/360	7KK-G002-28	
Test Mix				
Zebron	ZB-5		AG0-5155	

ZB-5HT Inferno™

- For high-temperature applications, or dirty samples

ID (mm)	df (µm)	Temp. Limits °C	Part No.	Price
15-Meter				
0.25	0.10	-60 to 400/430	7EG-G015-02	
0.32	0.10	-60 to 400/430	7EM-G015-02	
0.32	0.25	-60 to 400/430	7EM-G015-11	
0.53	0.15	-60 to 400	7EK-G015-05	
20-Meter				
0.18	0.18	-60 to 400/430	7FD-G015-08	
30-Meter				
0.25	0.10	-60 to 400/430	7HG-G015-02	
0.25	0.25	-60 to 400/430	7HG-G015-11	
0.32	0.10	-60 to 400/430	7HM-G015-02	
0.32	0.25	-60 to 400/430	7HM-G015-11	
0.53	0.15	-60 to 400	7HK-G015-05	
Test Mix				
Zebron	ZB-5HT		AG0-5155	

ZB-WAX

- Excellent for separating polar complex mixtures

ID(mm)	df(µm)	Temp. Limits °C	Part No.	Price
10-Meter				
0.10	0.10	40 to 250/260	7CB-G007-02	
15-Meter				
0.25	0.25	40 to 250/260	7EG-G007-11	
30-Meter				
0.25	0.15	40 to 250/260	7HG-G007-05	
0.25	0.25	40 to 250/260	7HG-G007-11	
0.25	0.50	40 to 250/260	7HG-G007-17	
0.25	1.00	40 to 250/260	7HG-G007-22	
0.32	0.15	40 to 250/260	7HM-G007-05	
0.32	0.25	40 to 250/260	7HM-G007-11	
0.32	0.50	40 to 250/260	7HM-G007-17	
0.53	0.50	40 to 250/260	7HK-G007-17	
0.53	1.00	40 to 250/260	7HK-G007-22	
60-Meter				
0.25	0.25	40 to 250/260	7KG-G007-11	
0.53	1.00	40 to 250/260	7KK-G007-22	
Test Mix				
Zebron	ZB-WAX		AG0-5158	

ZB-5MSi

- Great for the analysis of active compounds

ID (mm)	df (µm)	Temp. Limits °C	Part No.	Price
15-Meter				
0.25	0.25	-60 to 360/370	7EG-G018-11	
30-Meter				
0.25	0.25	-60 to 360/370	7HG-G018-11	
0.25	0.50	-60 to 360/370	7HG-G018-17	
0.32	0.25	-60 to 360/370	7HM-G018-11	
0.32	0.50	-60 to 360/370	7HM-G018-17	
60-Meter				
0.25	0.25	-60 to 360/370	7KG-G018-11	
Test Mix				
Zebron	ZB-5MSi		AG0-8362	

Suitable for MS sensitive analysis

ZB-5ms

- Perfect for Aromatics, PAHs, or PCBs

ID (mm)	df (µm)	Temp. Limits °C	Part No.	Price
10-Meter				
0.10	0.10	-60 to 325/350	7CB-G010-02	
15-Meter				
0.25	0.25	-60 to 325/350	7EG-G010-11	
20-Meter				
0.18	0.18	-60 to 325/350	7FD-G010-08	
0.18	0.32	-60 to 325/350	7FD-G010-51	
0.18	0.36	-60 to 325/350	7FD-G010-53	
30-Meter				
0.25	0.25	-60 to 325/350	7HG-G010-11	
0.25	0.50	-60 to 325/350	7HG-G010-17	
0.25	1.00	-60 to 325/350	7HG-G010-22	
0.32	0.25	-60 to 325/350	7HM-G010-11	
0.32	0.50	-60 to 325/350	7HM-G010-17	
0.32	1.00	-60 to 325/350	7HM-G010-22	
60-Meter				
0.25	0.25	-60 to 325/350	7KG-G010-11	
0.32	0.25	-60 to 325/350	7KM-G010-11	
Test Mix				
Zebron	ZB-5ms		AG0-7578	

If you need a 5 in. cage, simply add a (-B) after the part number, e.g., 7HG-G002-11-B.

ZB-50

- Rugged column for general screening of environmental compounds

ID (mm)	df (µm)	Temp. Limits °C	Part No.	Price
15-Meter				
0.25	0.15	40 to 320/340	7EG-G004-05	
0.25	0.25	40 to 320/340	7EG-G004-11	
0.32	0.25	40 to 320/340	7EM-G004-11	
0.32	0.50	40 to 320/340	7EM-G004-17	
0.53	1.00	40 to 320/340	7EK-G004-22	
30-Meter				
0.25	0.25	40 to 320/340	7HG-G004-11	
0.25	0.50	40 to 320/340	7HG-G004-17	
0.32	0.25	40 to 320/340	7HM-G004-11	
0.32	0.50	40 to 320/340	7HM-G004-17	
0.53	1.00	40 to 320/340	7HK-G004-22	
60-Meter				
0.25	0.25	40 to 320/340	7KG-G004-11	
0.25	0.50	40 to 320/340	7KG-G004-17	
0.32	0.25	40 to 320/340	7KM-G004-22	
Test Mix				
Zebron	ZB-50		AG0-5157	

ZB-624

- Provides enhanced resolution of VOCs

ID (mm)	df (µm)	Temp. Limits °C	Part No.	Price
20-Meter				
0.18	1.00	-20 to 260	7FD-G005-22	
30-Meter				
0.25	1.40	-20 to 260	7HG-G005-27	
0.32	1.80	-20 to 260	7HM-G005-31	
0.53	3.00	-20 to 260	7HK-G005-36	
60-Meter				
0.25	1.40	-20 to 260	7KG-G005-27	
0.32	1.80	-20 to 260	7KM-G005-31	
0.53	3.00	-20 to 260	7KK-G005-36	
75-Meter				
0.53	3.00	-20 to 260	7LK-G005-36	
105-Meter				
0.53	3.00	-20 to 260	7NK-G005-36	
Test Mix				
Zebron	ZB-624		AG0-5159	

ZB-MultiResidue™-1 & -2

- Delivers improved analysis of pesticides, herbicides and insecticides

ZB-MR-1

ID (mm)	df (µm)	Temp. Limits °C	Part No.	Price
30-Meter				
0.25	0.25	-60 to 320/340	7HG-G016-11	
0.32	0.50	-60 to 320/340	7HM-G016-17	
0.53	0.50	-60 to 320/340	7HK-G016-17	

ZB-MR-2

ID (mm)	df (µm)	Temp. Limits °C	Part No.	Price
30-Meter				
0.25	0.20	-60 to 320/340	7HG-G017-10	
0.32	0.25	-60 to 320/340	7HM-G017-11	
0.53	0.50	-60 to 320/340	7HK-G017-17	

ZB-XLB

- Ideal for identifying unknown contaminants

ID (mm)	df (µm)	Temp. Limits °C	Part No.	Price
15-Meter				
0.25	0.25	30 to 340/360	7EG-G019-11	
20-Meter				
0.18	0.18	30 to 340/360	7FD-G019-08	
30-Meter				
0.25	0.25	30 to 340/360	7HG-G019-11	
0.25	0.50	30 to 340/360	7HG-G019-17	
0.32	0.25	30 to 340/360	7HM-G019-11	
0.32	0.50	30 to 340/360	7HM-G019-17	
0.53	1.50	30 to 320/340	7HK-G019-28	
60-Meter				
0.25	0.25	30 to 340/360	7KG-G019-11	
Test Mix				
Zebron	ZB-XLB		AG0-7578	

If you need a 5 in. cage, simply add a (-B) after the part number, e.g., 7HG-G004-11-B.

Inlet Base Seals

- Prevents analyte adsorption
- Improves detection sensitivity
- Improves method reproducibility
- Fits all Agilent 5890/6890 split/splitless injection ports

Gold Inlet Base Seals

Part No.	Description	Similar to Mfr. No.*	Unit	Price
Standard, single groove for splitless applications, 0.8 mm dia. inlet hole				
AG0-7518	Gold Inlet Base Seal, splitless (single groove), 0.8 mm	18740-20885	2/pk	
AG0-7519	Gold Inlet Base Seal, splitless (single groove), 0.8 mm	18740-20885	10/pk	
High Split Flow, cross groove for split applications, 0.8 mm dia. inlet hole				
AG0-7520	Gold Inlet Base Seal, split (double groove/cross), 0.8 mm	5182-9652	2/pk	
AG0-7521	Gold Inlet Base Seal, split (double groove/cross), 0.8 mm	5182-9652	10/pk	
Replacement Inlet Seal Washers				
AG0-8397	Inlet Seal Washers, for Agilent GC injection port	—	12/pk	

*Similar to but not always an exact equivalent to the original manufacturer's product.

new

Stainless Steel Inlet Base Seals

Part No.	Description	Similar to Mfr. No.*	Unit	Price
Standard, single groove for splitless applications, 0.8 mm dia. inlet hole				
AG0-8393	Stainless Steel Inlet Base Seal, splitless (single groove), 0.8 mm	18740-20880	2/pk	
AG0-8394	Stainless Steel Inlet Base Seal, splitless (single groove), 0.8 mm	18740-20880	10/pk	
High Split Flow, cross groove for split applications, 0.8 mm dia. inlet hole				
AG0-8395	Stainless Steel Inlet Base Seal, split (double groove/cross), 0.8 mm	–	2/pk	
AG0-8396	Stainless Steel Inlet Base Seal, split (double groove/cross), 0.8 mm	–	10/pk	
Replacement Inlet Seal Washers				
AG0-7522	Inlet Seal Washers, Stainless Steel, for Agilent GC injection port	5061-5869	12/pk	

GuideRight™ Injection Hole Septa

The GuideRight™ through-hole guides the needle during injection. Septum performance and lifetime increase while downtime due to bent needles or dirty injection ports decreases. Choose from either high temperature PhenoGreen™ or PhenoRed™, both rated to 400 °C.

Part No.	Description	Unit	Price
PhenoGreen ⅜ in. (9.5 mm) Diameter			
AG0-7874	PhenoGreen™ 400 Injector Septa	50/pk	
PhenoGreen 7⁄16 in. (11 mm) Diameter			
AG0-7875	PhenoGreen™ 400 Injector Septa	50/pk	
PhenoRed ⅜ in. (9.5 mm) Diameter			
AG0-7916	PhenoRed™ 400 Injector Septa	50/pk	
PhenoRed 7⁄16 in. (11 mm) Diameter			
AG0-7917	PhenoRed™ 400 Injector Septa	50/pk	

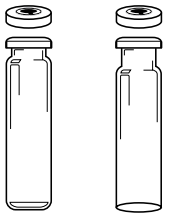
Long Graphite Ferrules

- High-purity graphite significantly reduces ferrule bleed
- Special construction minimizes "flaking"
- Stable to 450 °C - excellent for high temperature use
- Not for use with GC/MS transfer lines

Part No.	Description		Unit	Price
0.4 mm Ferrule ID				
AG0-4698	Graphite Ferrule	1⁄16 in. to 0.4 mm	10/pk	
AG0-4699	Graphite Ferrule	1⁄16 in. to 0.4 mm	50/pk	
0.5 mm Ferrule ID				
AG0-4701	Graphite Ferrule	1⁄16 in. to 0.5 mm	10/pk	
AG0-4702	Graphite Ferrule	1⁄16 in. to 0.5 mm	50/pk	
0.8 mm Ferrule ID				
AG0-4704	Graphite Ferrule	1⁄16 in. to 0.8 mm	10/pk	
AG0-4705	Graphite Ferrule	1⁄16 in. to 0.8 mm	50/pk	

Headspace Autosampler Vials

Part No.	Description	Price 100/pk
AH0-7546	Headspace Vial 20 mL clear, round bottom, 23 x 75 mm	
AH0-7547	Headspace Vial 20 mL clear, flat bottom, 23 x 75 mm	
AH0-7548	Aluminum Seal, with PTFE/Silicone septum, 0.130" thickness	
AH0-7550	Aluminum Seal, with Pharma-Fix molded pressure-release septum	
AG0-8350	Aluminum Seal, Magnetic Crimp Cap, 20 mm TEF/SIL, blue	



Round Bottom 20 mL Flat Bottom 20 mL

HPLC Columns

Synergi™

2.5 µm High Speed Technology (HST) Columns (mm)						
Phases	30 x 2.0	50 x 2.0	100 x 2.0	50 x 3.0	100 x 3.0	50 x 4.6
Max-RP	00A-4372-B0	00B-4372-B0	00D-4372-B0	00B-4372-Y0	00D-4372-Y0	00B-4372-E0
Hydro-RP	00A-4387-B0	00B-4387-B0	00D-4387-B0	00B-4387-Y0	00D-4387-Y0	00B-4387-E0
Polar-RP	00A-4371-B0	00B-4371-B0	00D-4371-B0	00B-4371-Y0	00D-4371-Y0	00B-4371-E0
Fusion-RP	00A-4423-B0	00B-4423-B0	00D-4423-B0	00B-4423-Y0	00D-4423-Y0	00B-4423-E0

4 µm Narrow Bore Columns (mm)				SecurityGuard™ Cartridges (mm)
Phases	50 x 3.0	150 x 3.0	250 x 3.0	4 x 2.0*
				/10pk
Max-RP	00B-4337-Y0	00F-4337-Y0	00G-4337-Y0	AJ0-6073
Hydro-RP	00B-4375-Y0	00F-4375-Y0	00G-4375-Y0	AJ0-7510
Polar-RP	00B-4336-Y0	00F-4336-Y0	00G-4336-Y0	AJ0-6075
Fusion-RP	00B-4424-Y0	00F-4424-Y0	00G-4424-Y0	AJ0-7556
				for ID: 2.0-3.0 mm

4 µm Microbore and Minibore Columns (mm)						SecurityGuard™ Cartridges (mm)
Phases	30 x 2.0	50 x 2.0	75 x 2.0	150 x 2.0	250 x 2.0	4 x 2.0*
						/10pk
Max-RP	00A-4337-B0	00B-4337-B0	00C-4337-B0	00F-4337-B0	00G-4337-B0	AJ0-6073
Hydro-RP	00A-4375-B0	00B-4375-B0	00C-4375-B0	00F-4375-B0	00G-4375-B0	AJ0-7510
Polar-RP	00A-4336-B0	00B-4336-B0	00C-4336-B0	00F-4336-B0	00G-4336-B0	AJ0-6075
Fusion-RP	00A-4424-B0	00B-4424-B0	00C-4424-B0	00F-4424-B0	00G-4424-B0	AJ0-7556
						for ID: 2.0-3.0 mm

4 µm Analytical Columns (mm)					SecurityGuard™ Cartridges (mm)
Phases	30 x 4.6	50 x 4.6	150 x 4.6	250 x 4.6	4 x 3.0*
					/10pk
Max-RP	00A-4337-E0	00B-4337-E0	00F-4337-E0	00G-4337-E0	AJ0-6074
Hydro-RP	00A-4375-E0	00B-4375-E0	00F-4375-E0	00G-4375-E0	AJ0-7511
Polar-RP	00A-4336-E0	00B-4336-E0	00F-4336-E0	00G-4336-E0	AJ0-6076
Fusion-RP	00A-4424-E0	00B-4424-E0	00F-4424-E0	00G-4424-E0	AJ0-7557
					for ID: 3.2-8.0 mm

Luna®

2.5 µm High Speed Technology (HST) Columns (mm)					
Phase	30 x 2.0	50 x 2.0	100 x 2.0	50 x 3.0	100 x 3.0
C18(2)-HST	00A-4446-B0	00B-4446-B0	00D-4446-B0	00B-4446-Y0	00D-4446-Y0

3 µm Microbore and Minibore Columns (mm)			SecurityGuard™ Cartridges (mm)
Phases	100 x 2.0	150 x 2.0	4 x 2.0
			/10pk
C8(2)	00D-4248-B0	00F-4248-B0	AJ0-4289
C18(2)	00D-4251-B0	00F-4251-B0	AJ0-4286
CN	00D-4254-B0	00F-4254-B0	AJ0-4304
Phenyl-Hexyl	00D-4256-B0	00F-4256-B0	AJ0-4350
			for ID: 2.0-3.0 mm

3 µm Analytical Columns (mm)				
Phases	30 x 4.6	100 x 4.6	150 x 4.6	4 x 3.0
				/10pk
C8(2)	00A-4248-E0	00D-4248-E0	00F-4248-E0	AJ0-4290
C18(2)	00A-4251-E0	00D-4251-E0	00F-4251-E0	AJ0-4287
CN	00A-4254-E0	00D-4254-E0	00F-4254-E0	AJ0-4305
Phenyl-Hexyl	00A-4256-E0	00D-4256-E0	00F-4256-E0	AJ0-4351
				3.2-8.0 mm

5 µm Microbore and Minibore Columns (mm)			SecurityGuard™ Cartridges (mm)
Phases	150 x 2.0	250 x 2.0	4 x 2.0*
			/10pk
C8(2)	00F-4249-B0	00G-4249-B0	AJ0-4289
C18(2)	00F-4252-B0	00G-4252-B0	AJ0-4286
CN	00F-4255-B0	00G-4255-B0	AJ0-4304
Phenyl-Hexyl	00F-4257-B0	00G-4257-B0	AJ0-4350
			for ID: 2.0-3.0 mm

5 µm Analytical Columns (mm)			SecurityGuard™ Cartridges (mm)
Phases	150 x 3.0	250 x 3.0	4 x 2.0*
			/10pk
C8(2)	00F-4249-Y0	00G-4249-Y0	AJ0-4289
C18(2)	00F-4252-Y0	00G-4252-Y0	AJ0-4286
CN	00F-4255-Y0	00G-4255-Y0	AJ0-4304
Phenyl-Hexyl	00F-4257-Y0	00G-4257-Y0	AJ0-4350
			for ID: 2.0-3.0 mm

5 µm Analytical Columns (mm)				SecurityGuard™ Cartridges (mm)
Phases	100 x 4.6	150 x 4.6	250 x 4.6	4 x 3.0*
				/10pk
C8(2)	00D-4249-E0	00F-4249-E0	00G-4249-E0	AJ0-4290
C18(2)	00D-4252-E0	00F-4252-E0	00G-4252-E0	AJ0-4287
CN	00D-4255-E0	00F-4255-E0	00G-4255-E0	AJ0-4305
Phenyl-Hexyl	00D-4257-E0	00F-4257-E0	00G-4257-E0	AJ0-4351
				for ID: 3.2-8.0 mm

EnviroSep™-PP

Part No.	Size (mm)	Price
03A-3029-R0	30 x 3.2 (Guard)	
03A-3029-E0	30 x 4.6 (Guard)	
00E-3029-B0	125 x 2.0	
00E-3029-R0	125 x 3.2	
00E-3029-E0	125 x 4.6	

SecurityGuard™ Analytical Cartridges require holder, Part No.: KJ0-4282

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